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Smith et al.

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(54) **MODULAR LATERAL HIP AUGMENTS**

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(73) Assignee: **Biomet Manufacturing, LLC**, Warsaw, IN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 68 days.

This patent is subject to a terminal disclaimer.

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(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Continuation of application No. 14/563,118, filed on Dec. 8, 2014, now Pat. No. 9,510,950, which is a (Continued)

(51) **Int. Cl.**

A61F 2/32	(2006.01)
A61F 2/36	(2006.01)
A61F 2/30	(2006.01)

(52) **U.S. Cl.**

CPC ..... ***A61F 2/3672*** (2013.01); ***A61F 2/30734*** (2013.01); ***A61F 2/30739*** (2013.01); (Continued)

(58) **Field of Classification Search**

CPC A61F 2/30739; A61F 2002/3627; A61F 2/367; A61F 2/3601; A61F 2/30734; A61F 2002/30736; A61F 2002/368

See application file for complete search history.

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(57) **ABSTRACT**

An implant for a hip can include a lateral augment adapted to be coupled to a lateral side of a femoral body implant. The lateral augment can include a body portion having a first surface, a second surface opposite the first surface, and a protrusion extending from the second surface. The protrusion can have a shape adapted to mate with a complementary shaped recess formed in the lateral side of the femoral body implant. An aperture can be positioned in the body portion and extend through the protrusion. A fastener can be received through the aperture and adapted to be threadably secured to the lateral bore. The fastener can be configured to have a length sufficient to pass through a portion of a greater

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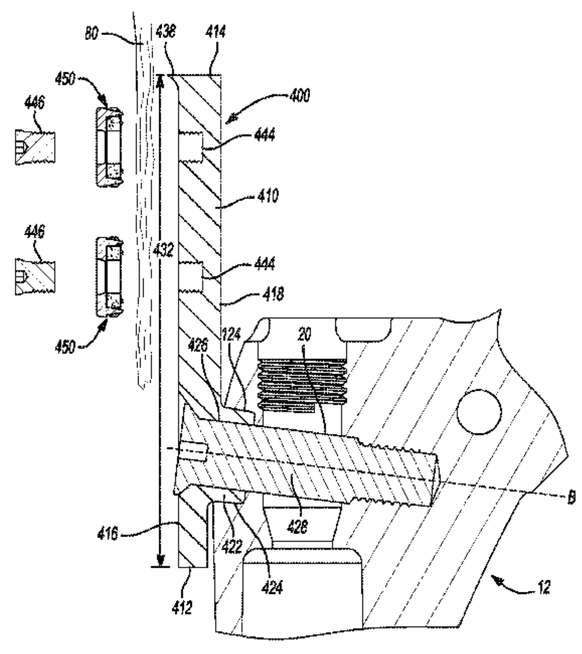

trochanter for securing the portion of the greater trochanter and the lateral augment to the femoral body implant.

14 Claims, 23 Drawing Sheets

Related U.S. Application Data

division of application No. 13/913,858, filed on Jun. 10, 2013, now Pat. No. 8,906,109, which is a division of application No. 12/718,230, filed on Mar. 5, 2010, now Pat. No. 8,460,393.

(52) **U.S. Cl.**
CPC ***A61F 2/32*** (2013.01); ***A61F 2/3601*** (2013.01); ***A61F 2/367*** (2013.01); *A61F 2002/368* (2013.01); *A61F 2002/3627* (2013.01); *A61F 2002/3674* (2013.01); *A61F 2002/3686* (2013.01); *A61F 2310/00011* (2013.01)

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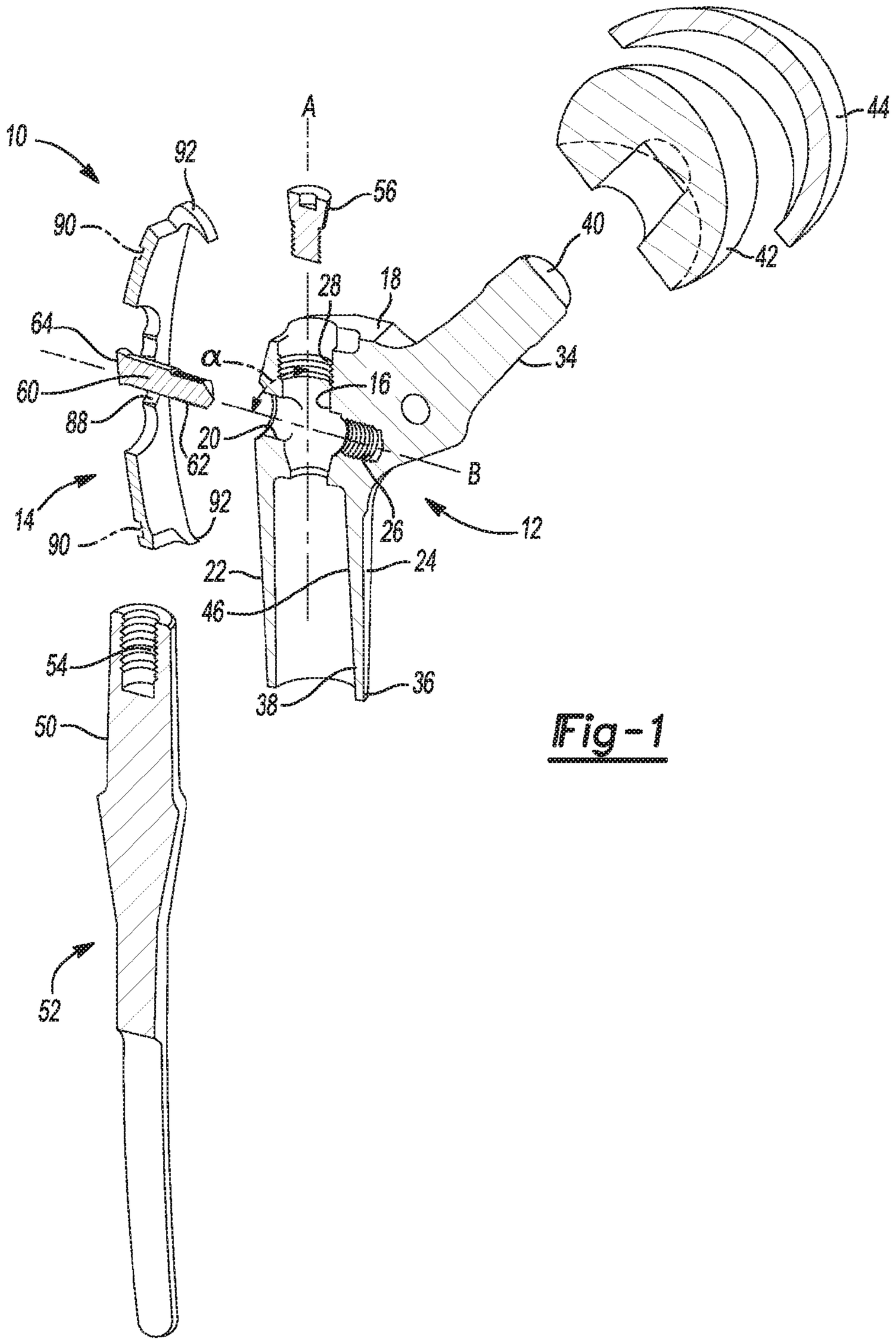
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Fig - 1

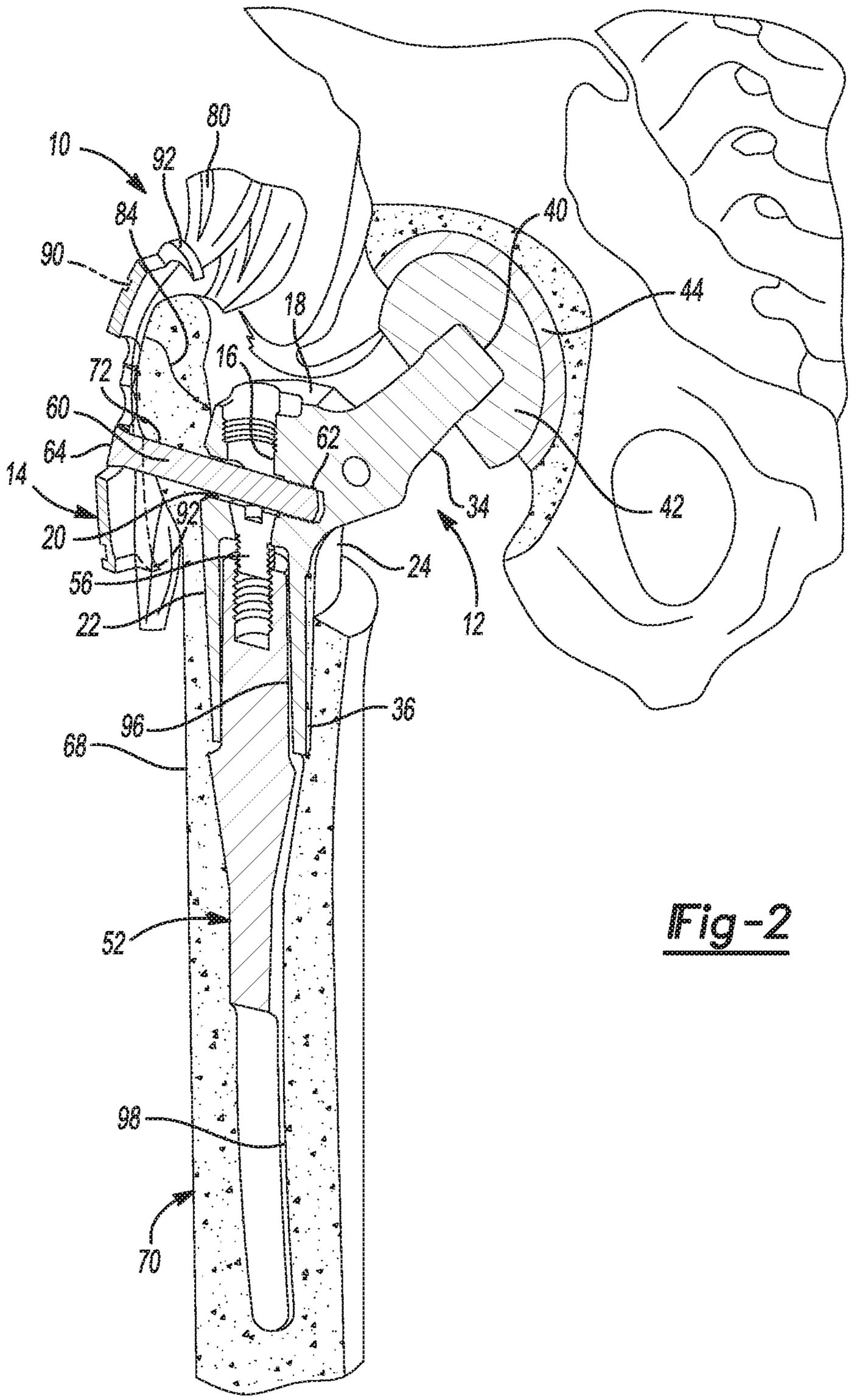
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Fig-2

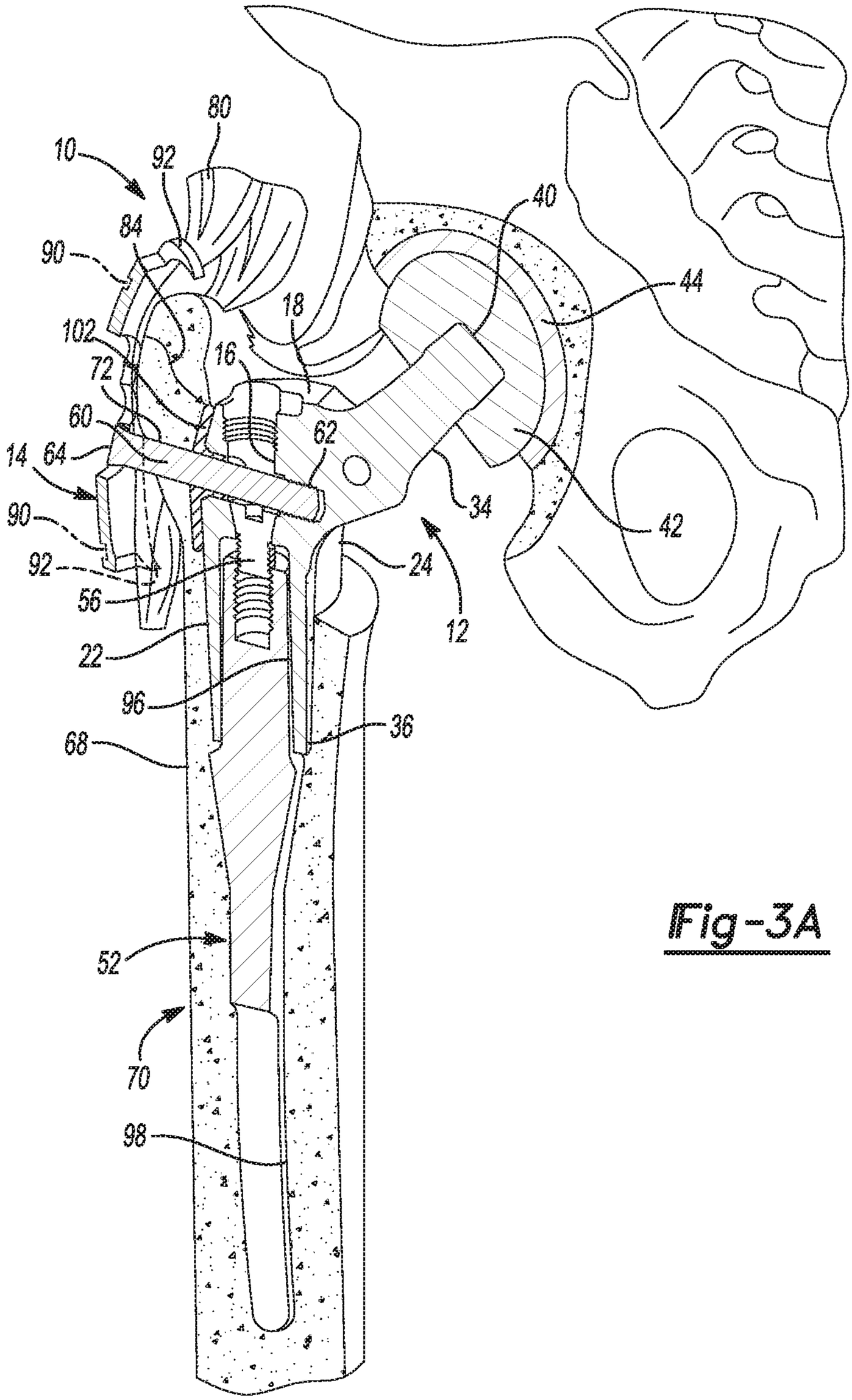
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Fig-3A

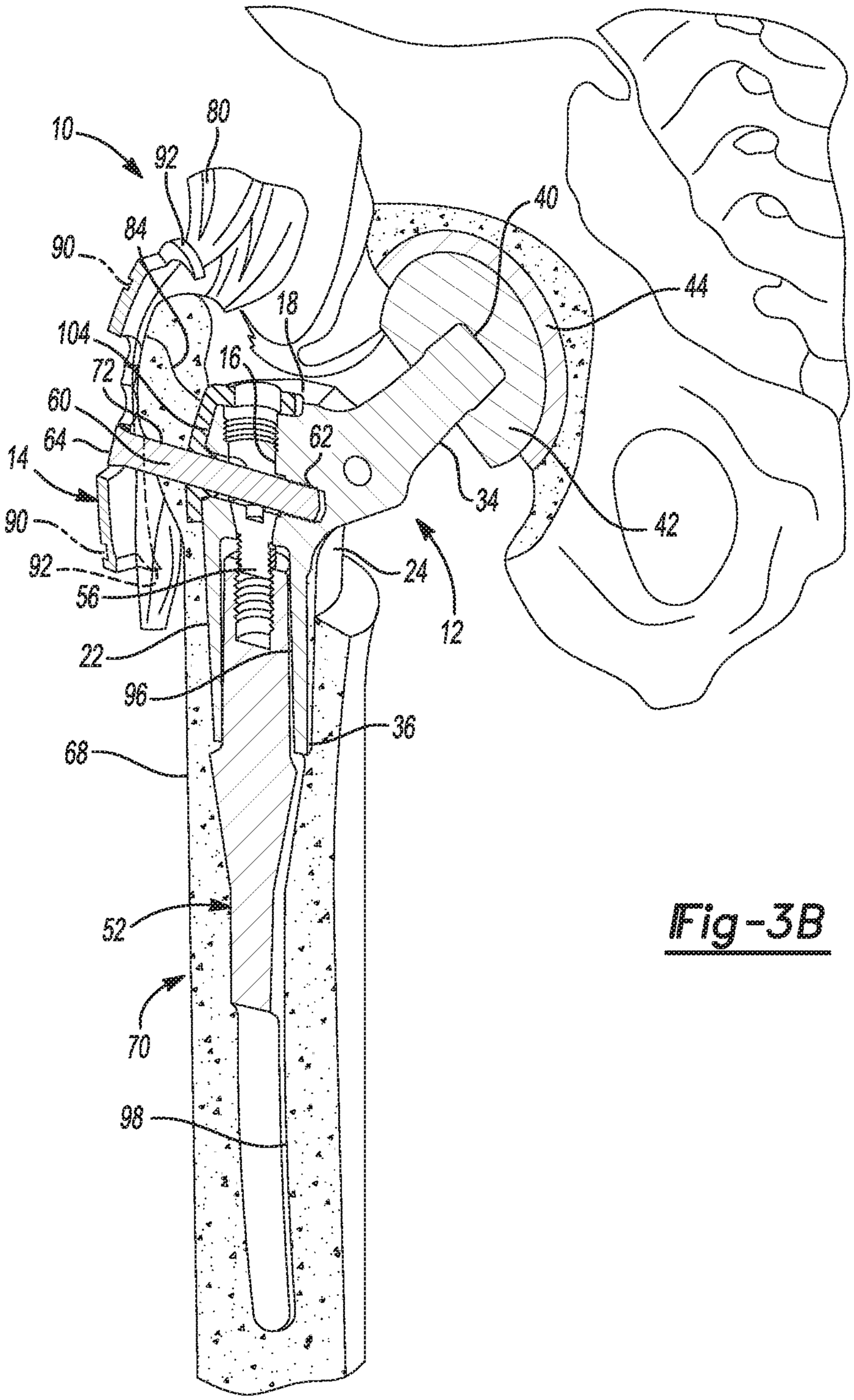
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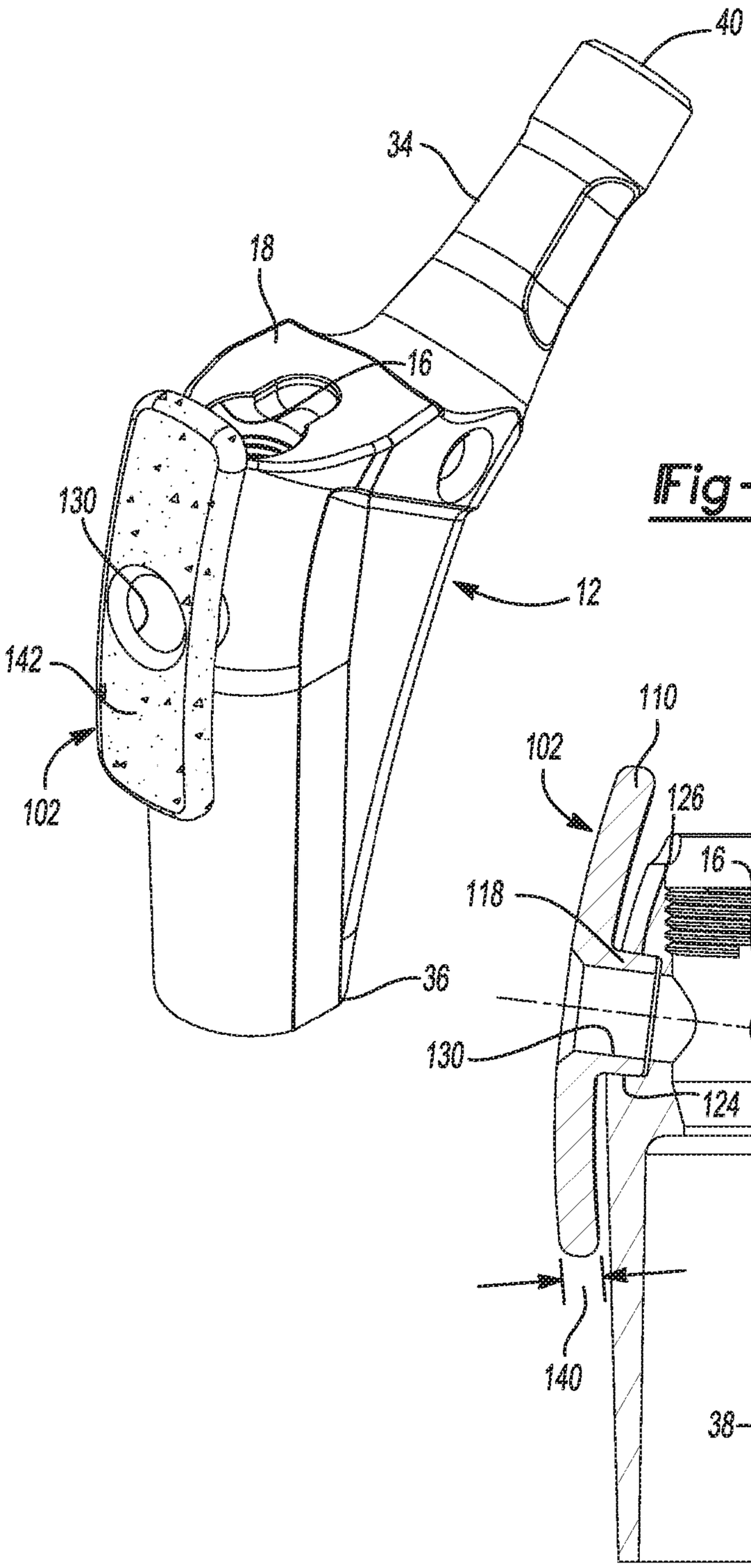
Fig-3B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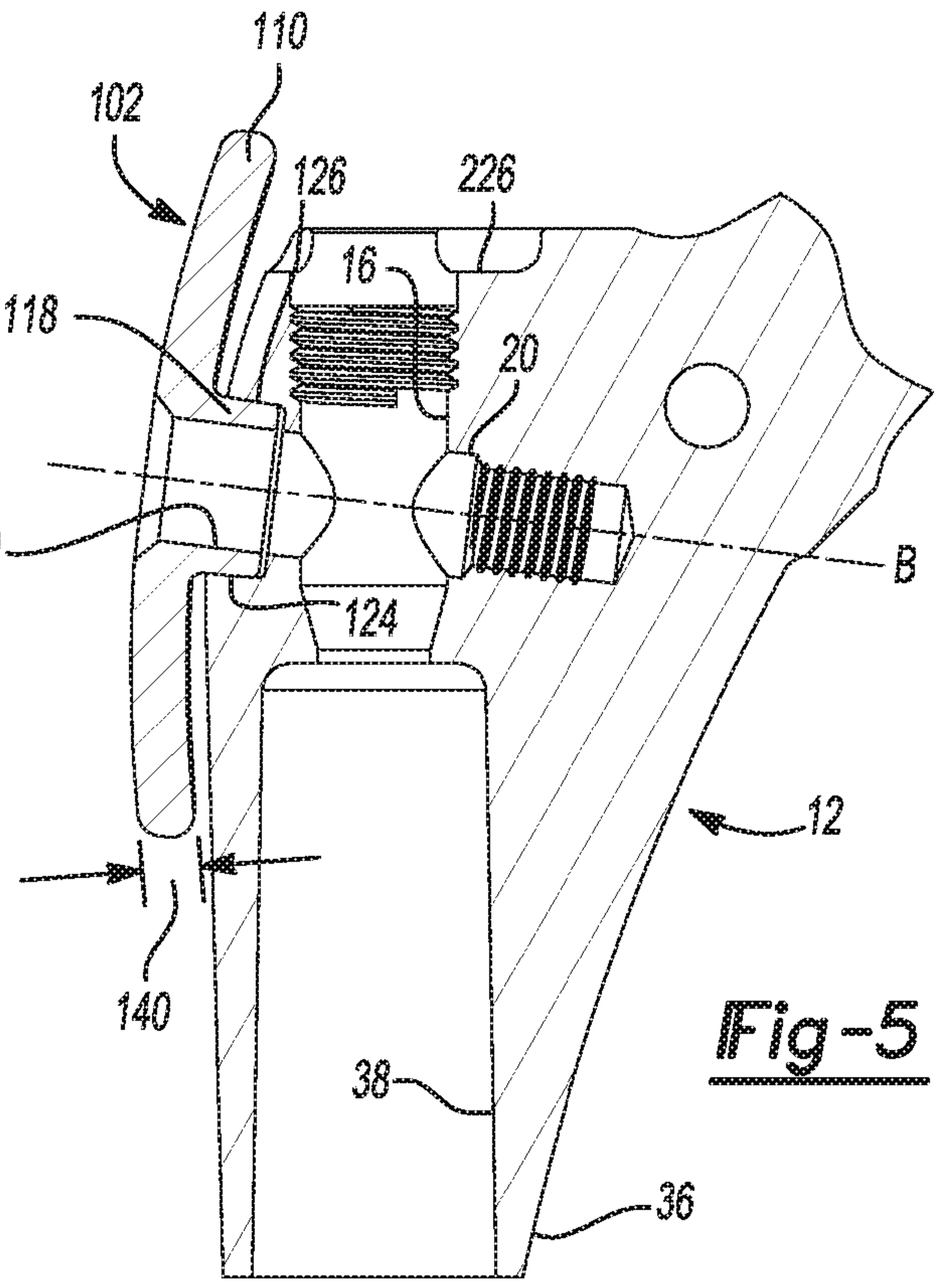
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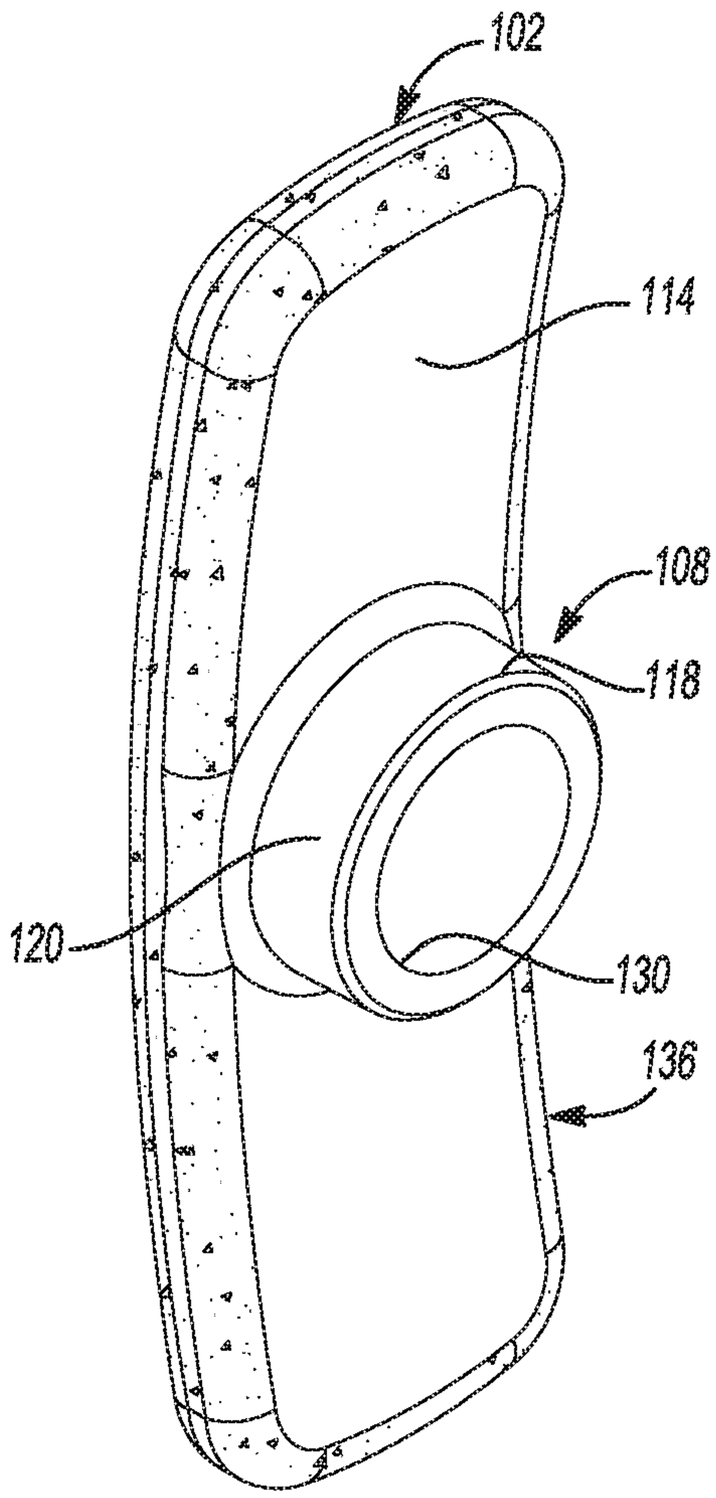

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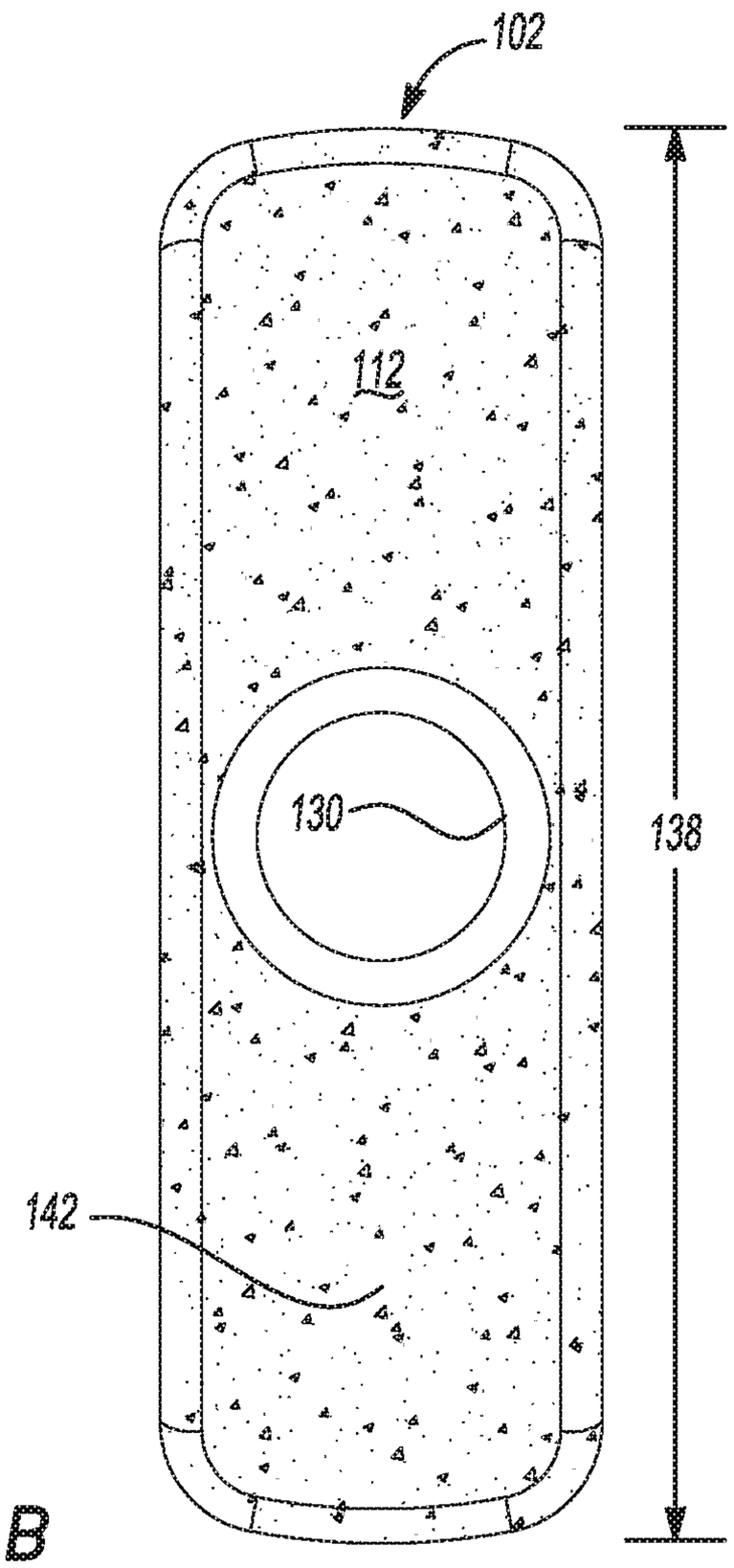

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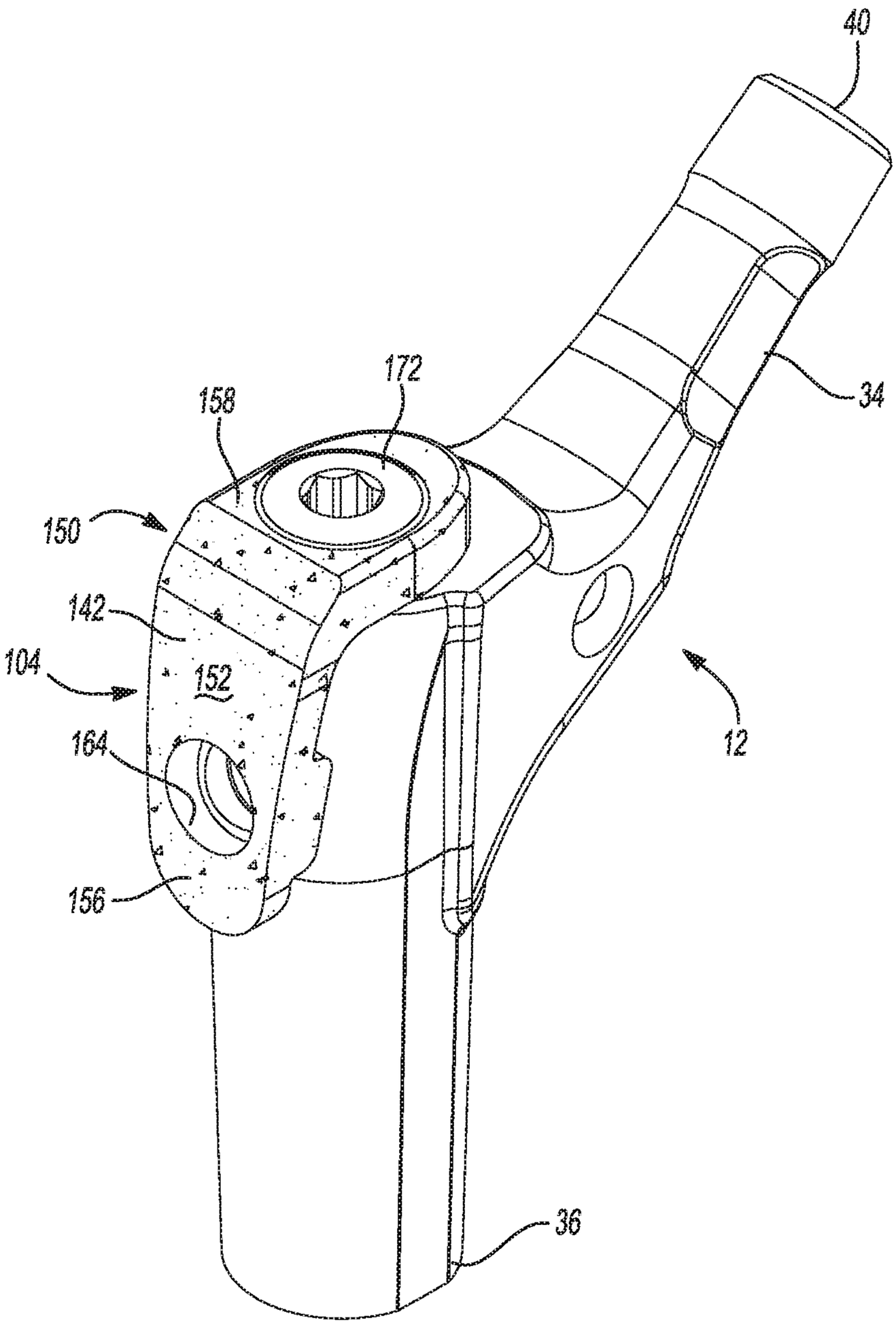

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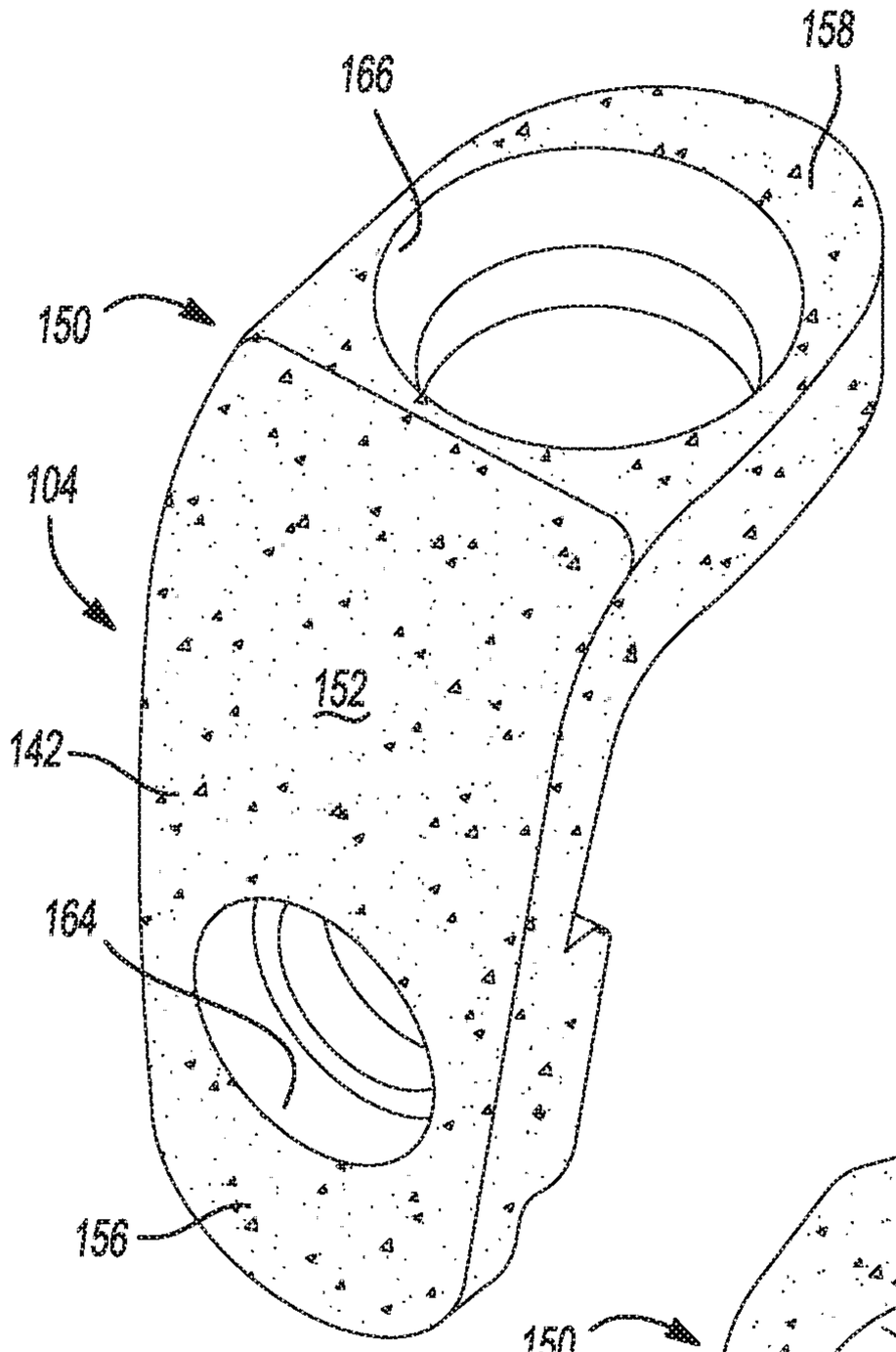

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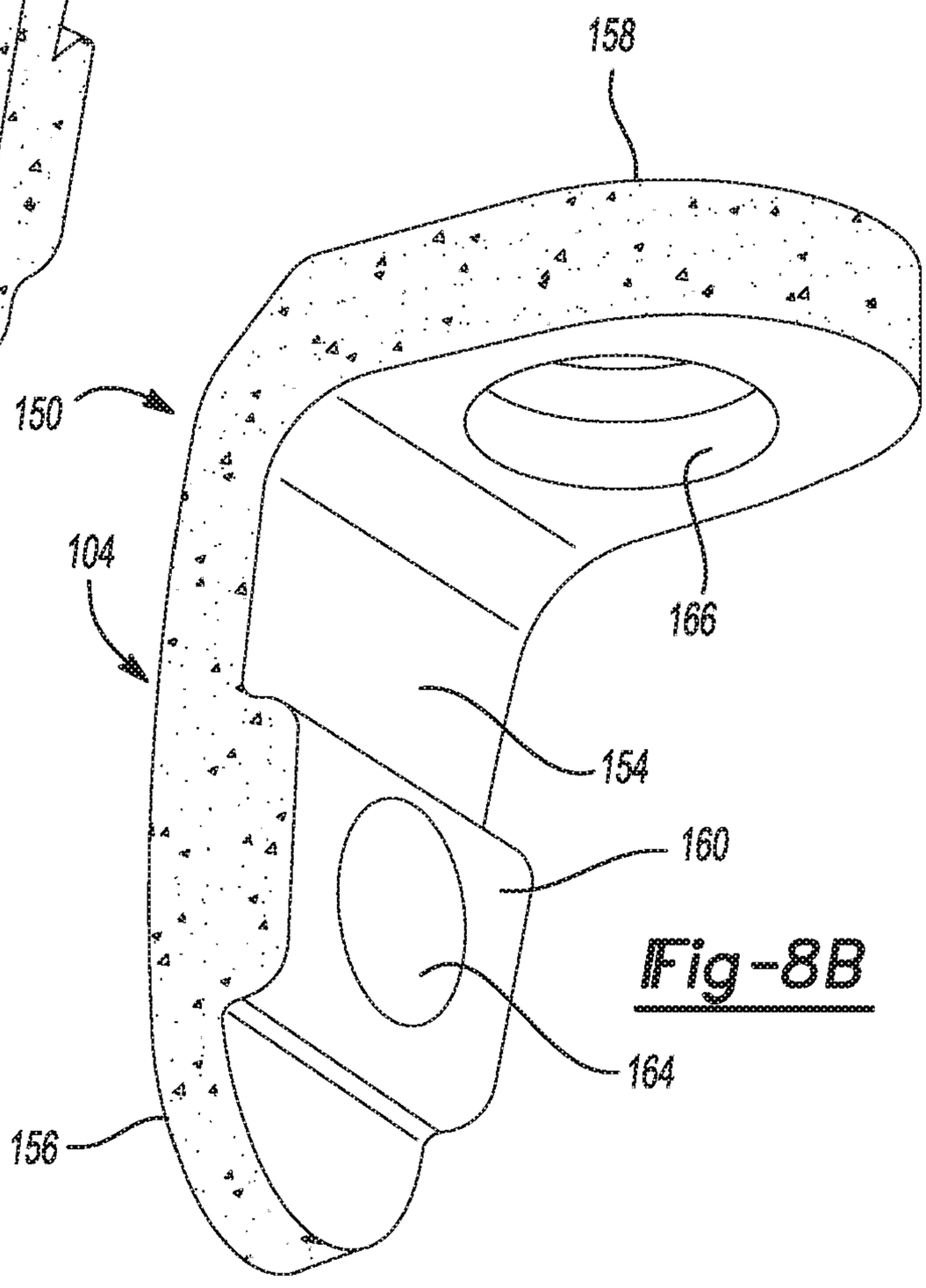

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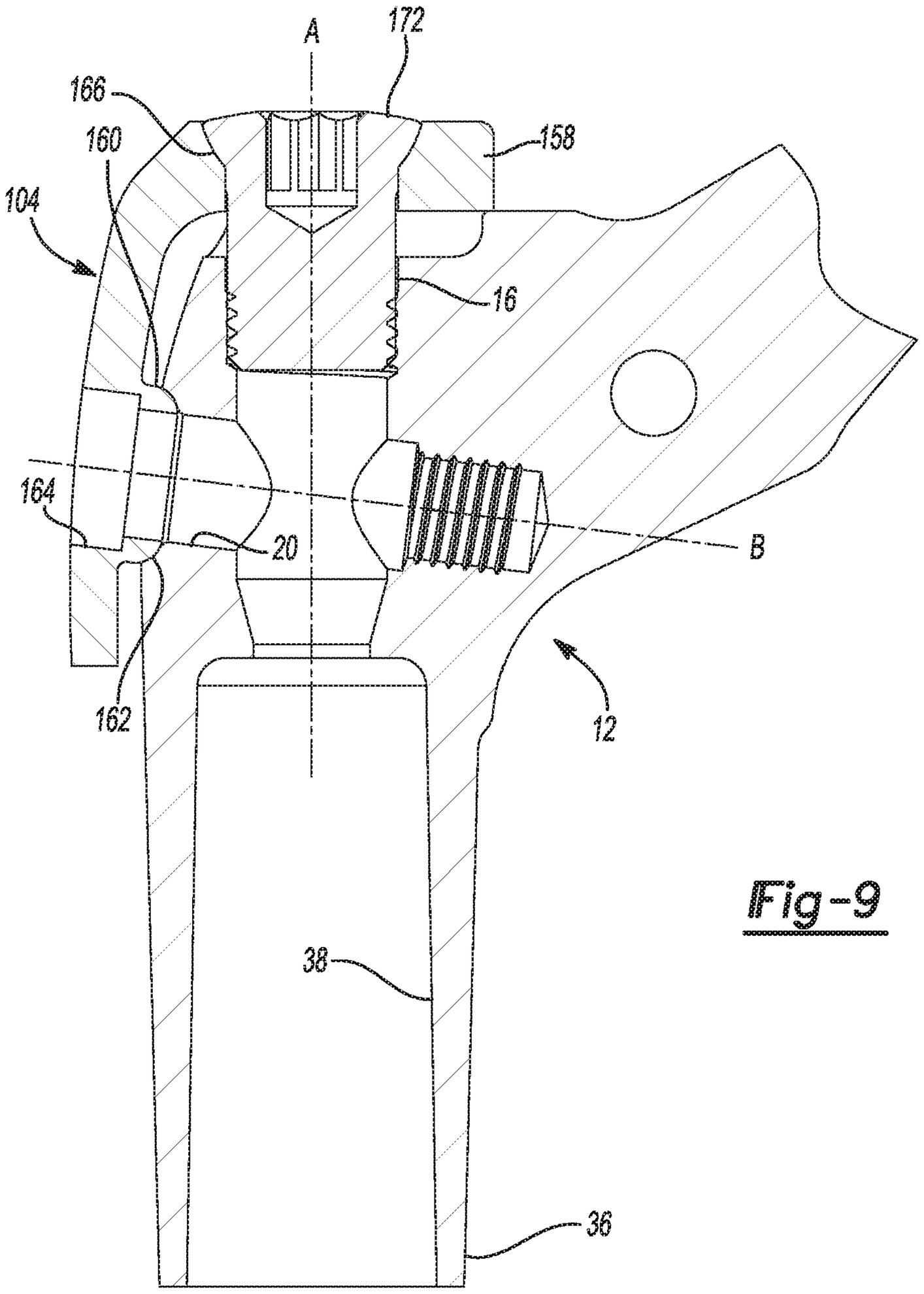

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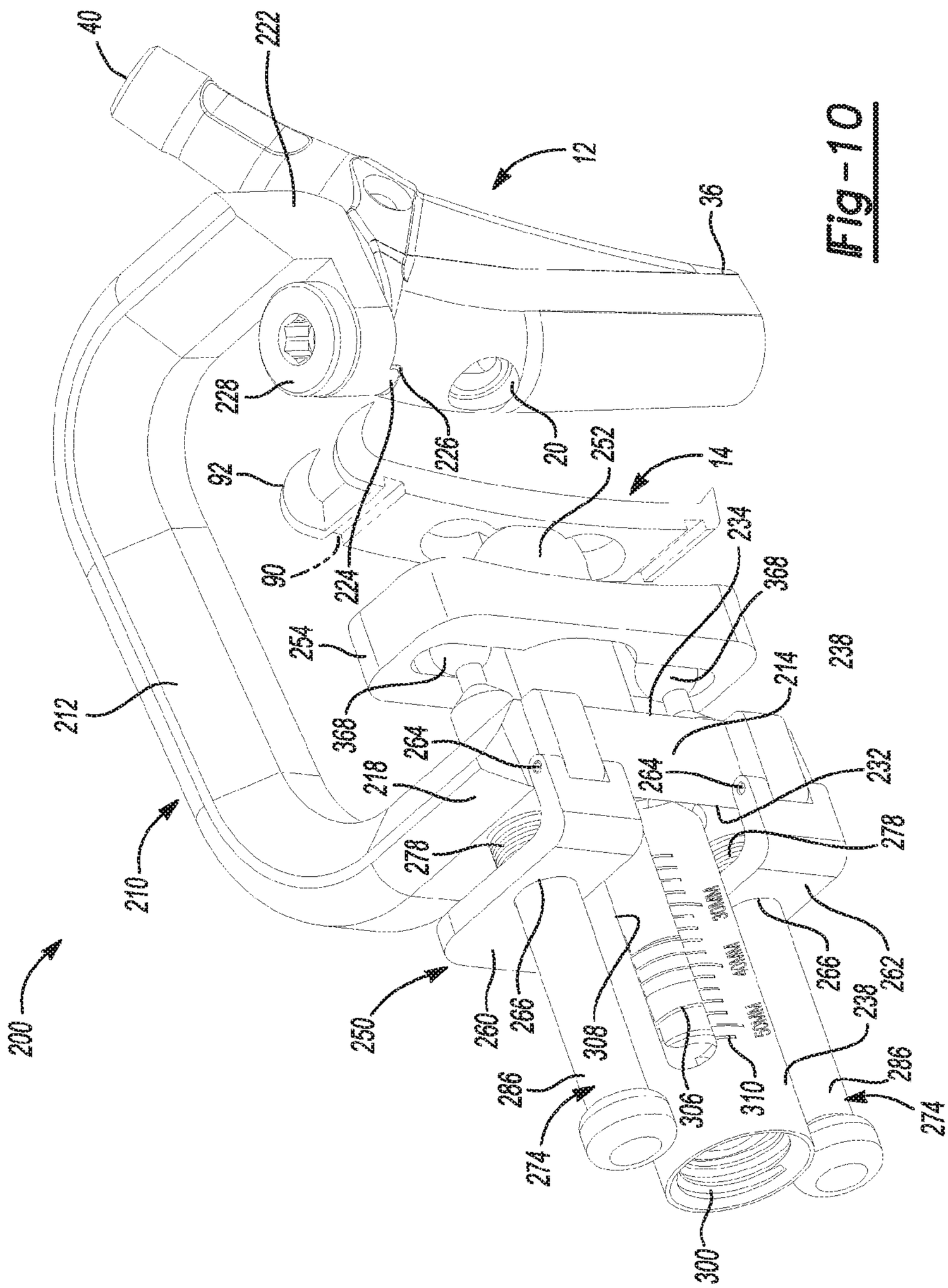
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Fig-10

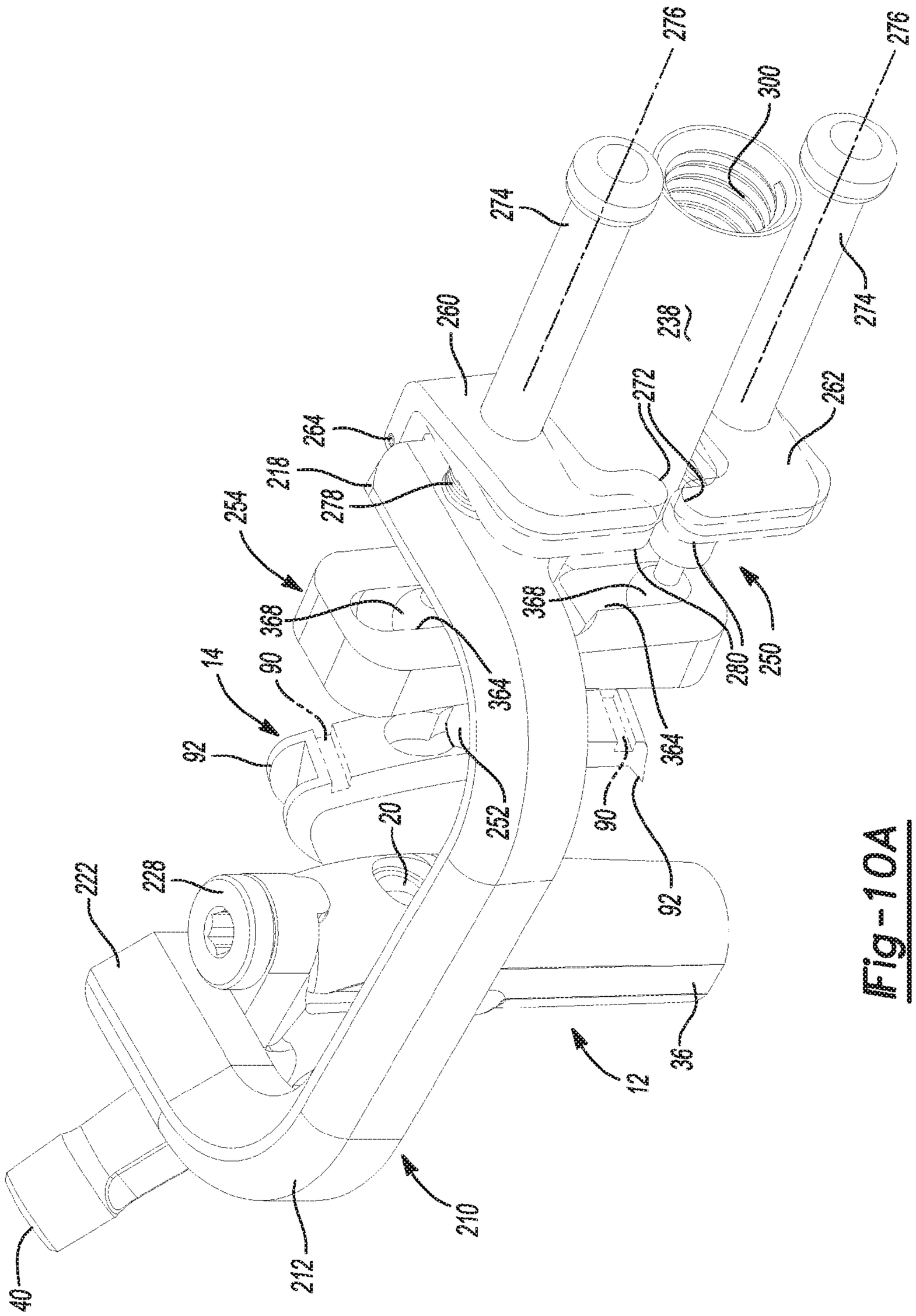
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Fig-10A

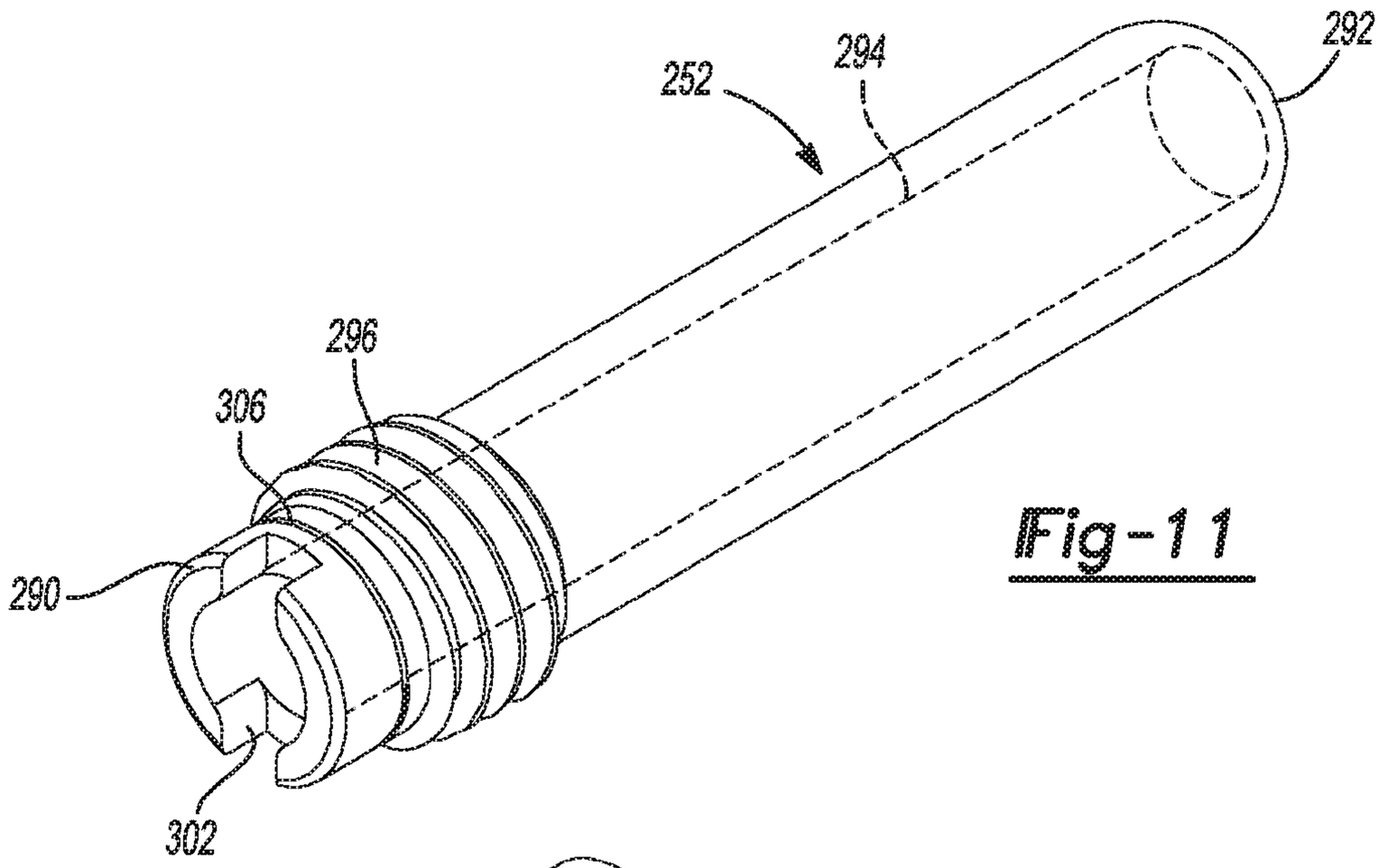


Fig-11

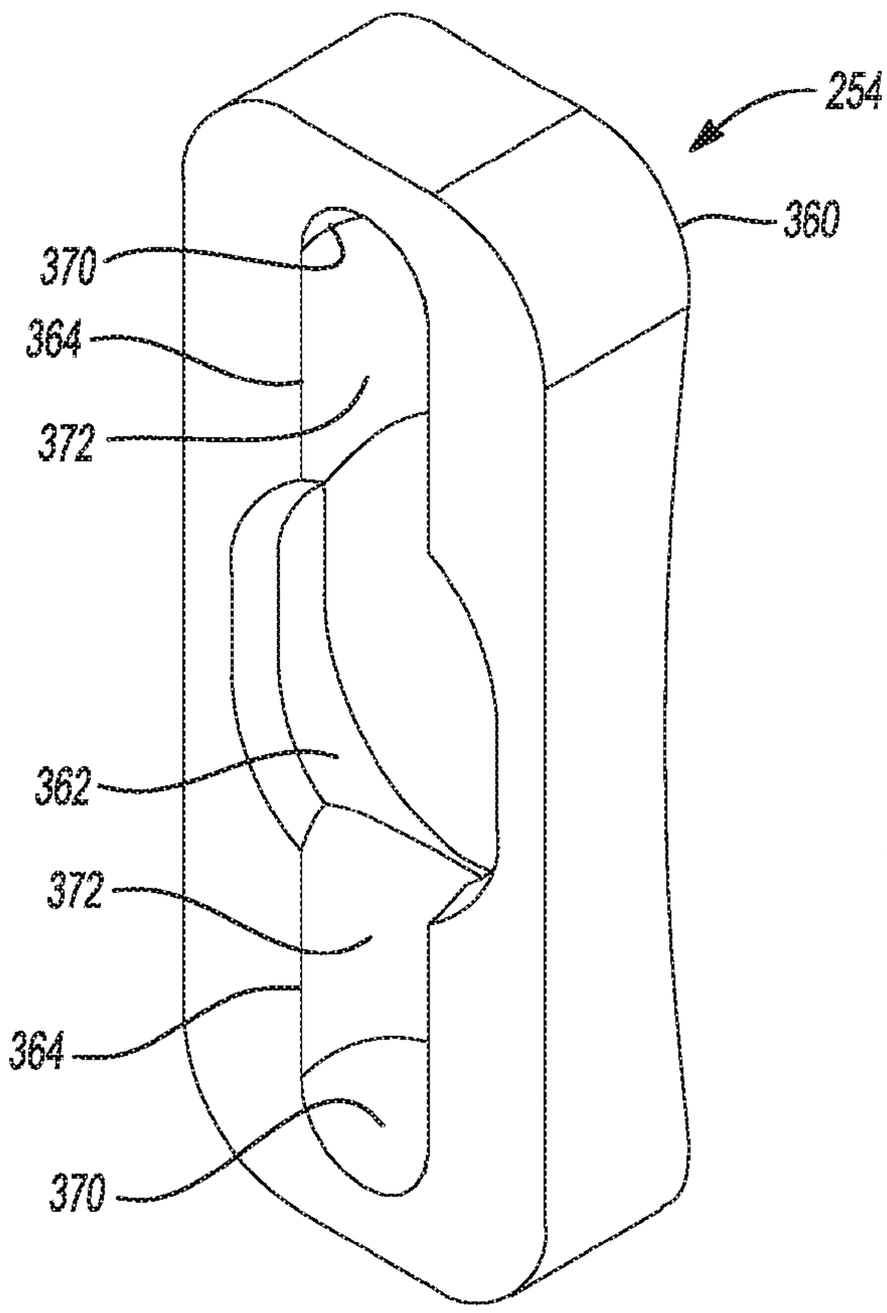
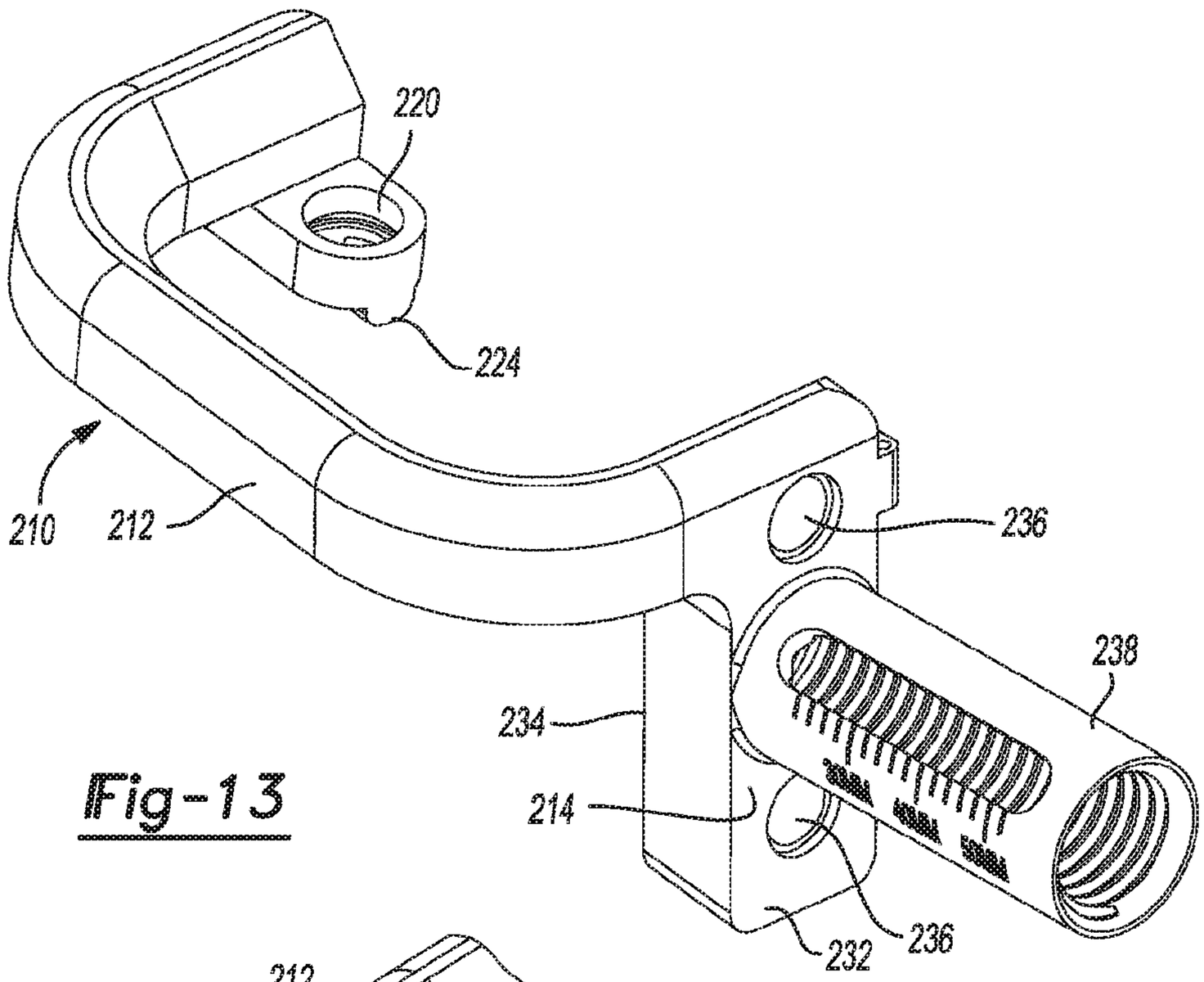


Fig-12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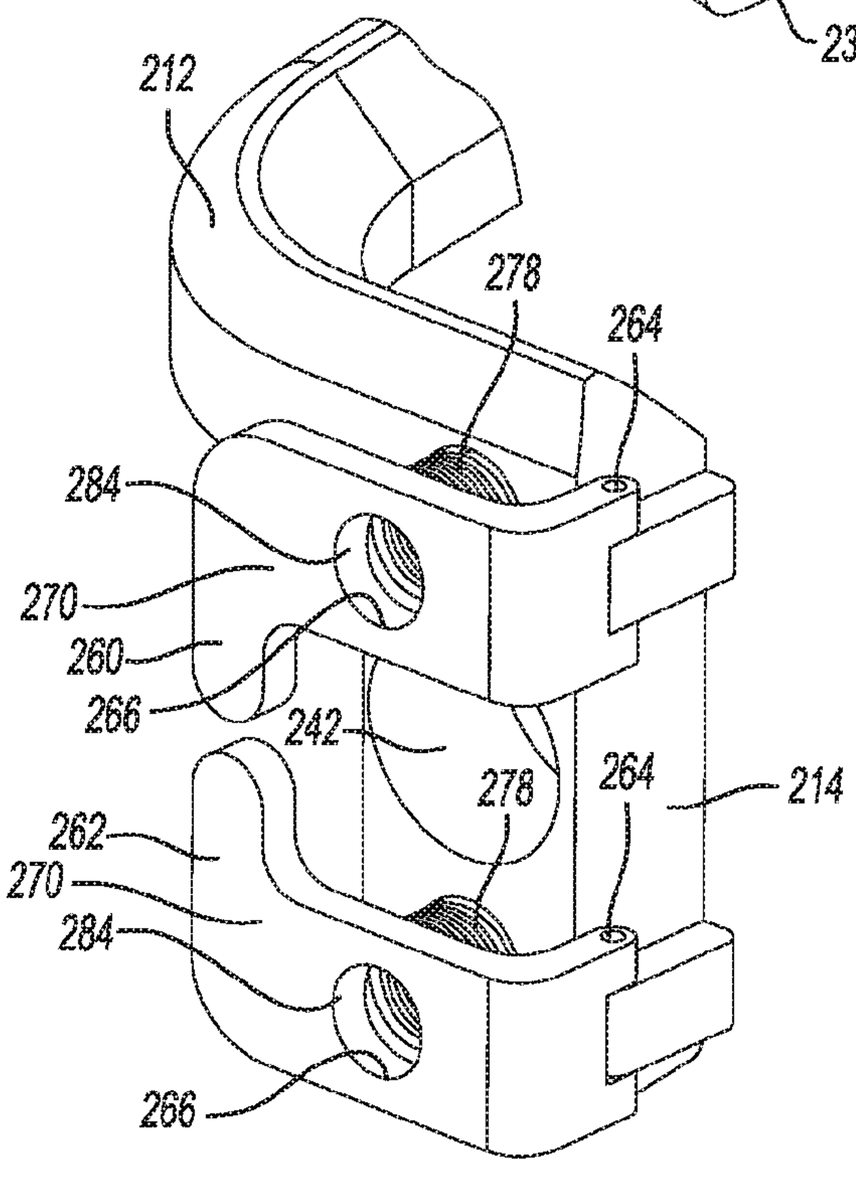
224
210
212
236
238
234
214
232
236

Fig-13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278
264
284
270
260
266
242
278
264
214
262
270
284
266

Fig-14

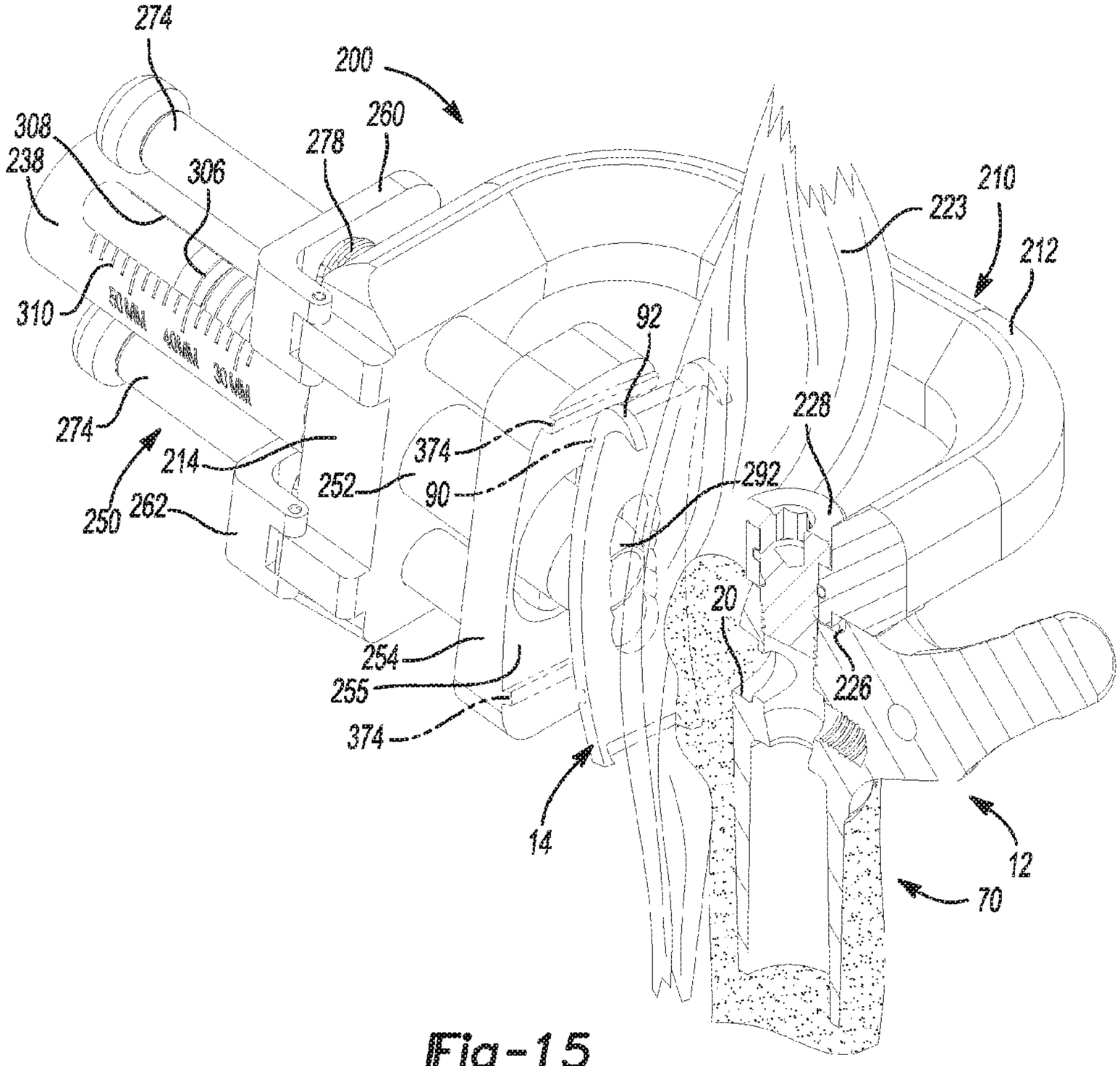
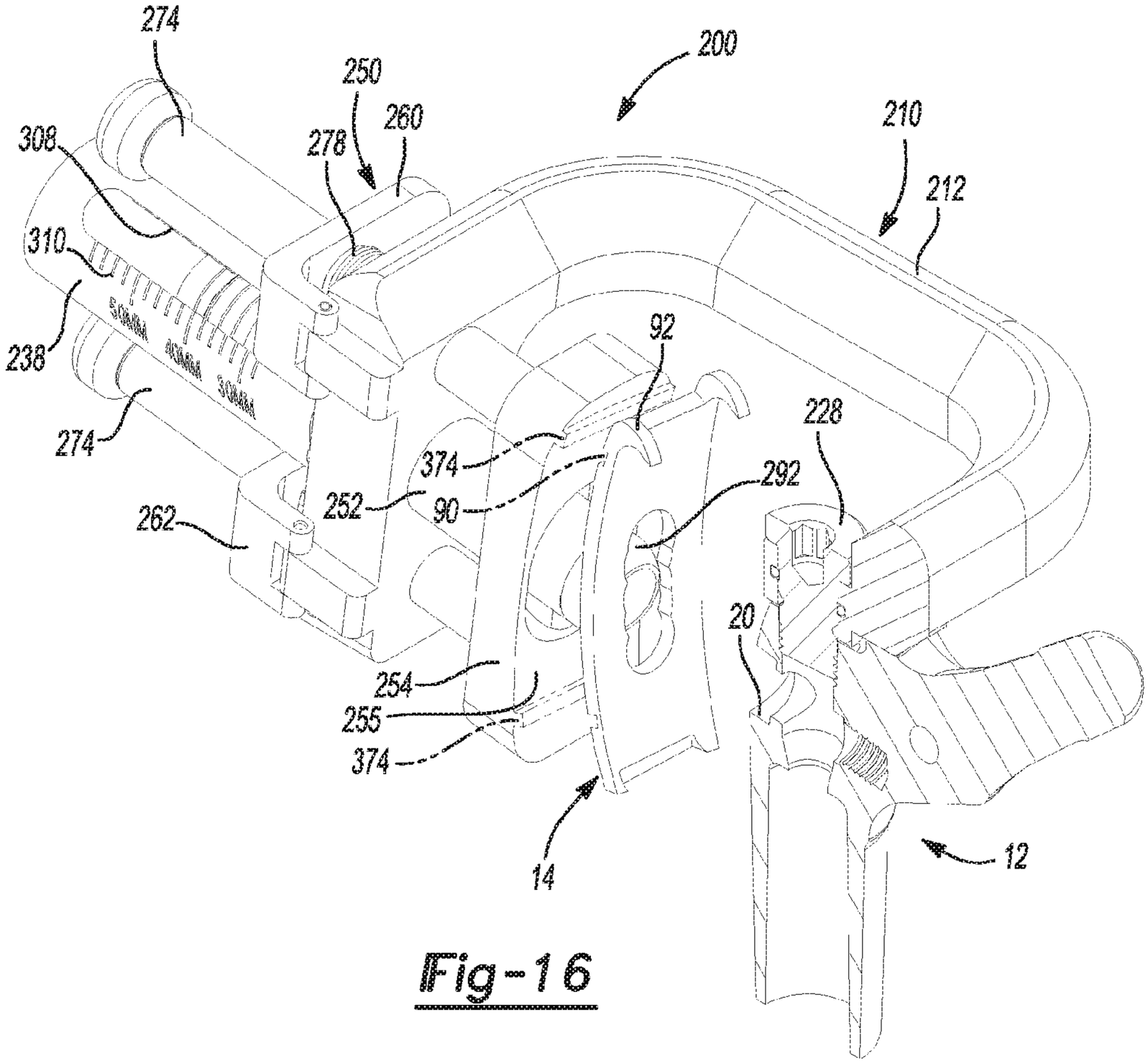

274
200
308
238
260
278
306
210
223
212
310
92
228
274
214
374
252
90
292
250
262
20
254
255
226
374
14
12
70

Fig-15


274
200
250
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278
210
212
308
310
238
92
274
228
374
292
252
90
262
20
254
255
374
14
12

Fig-16

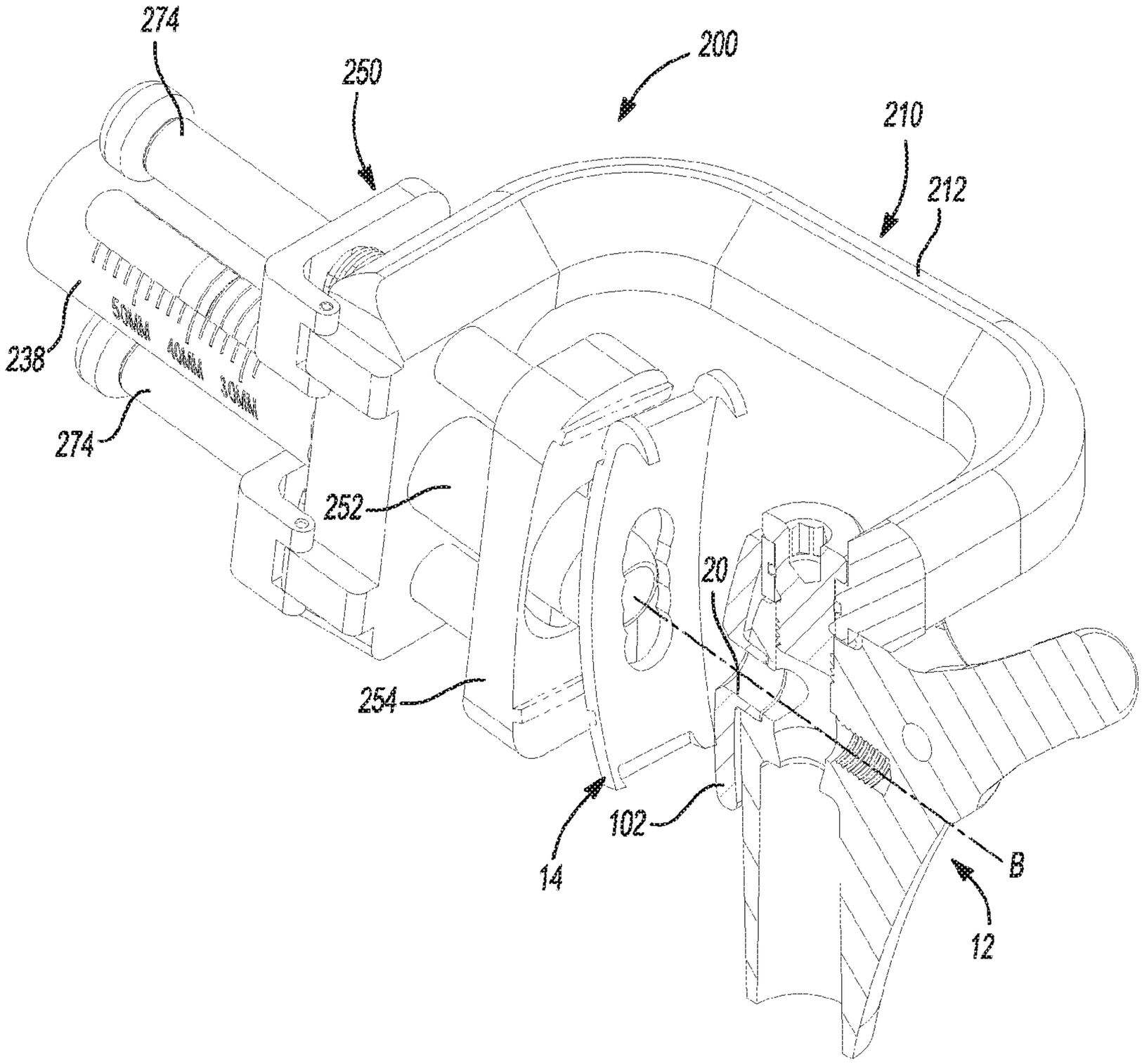


Fig-16A

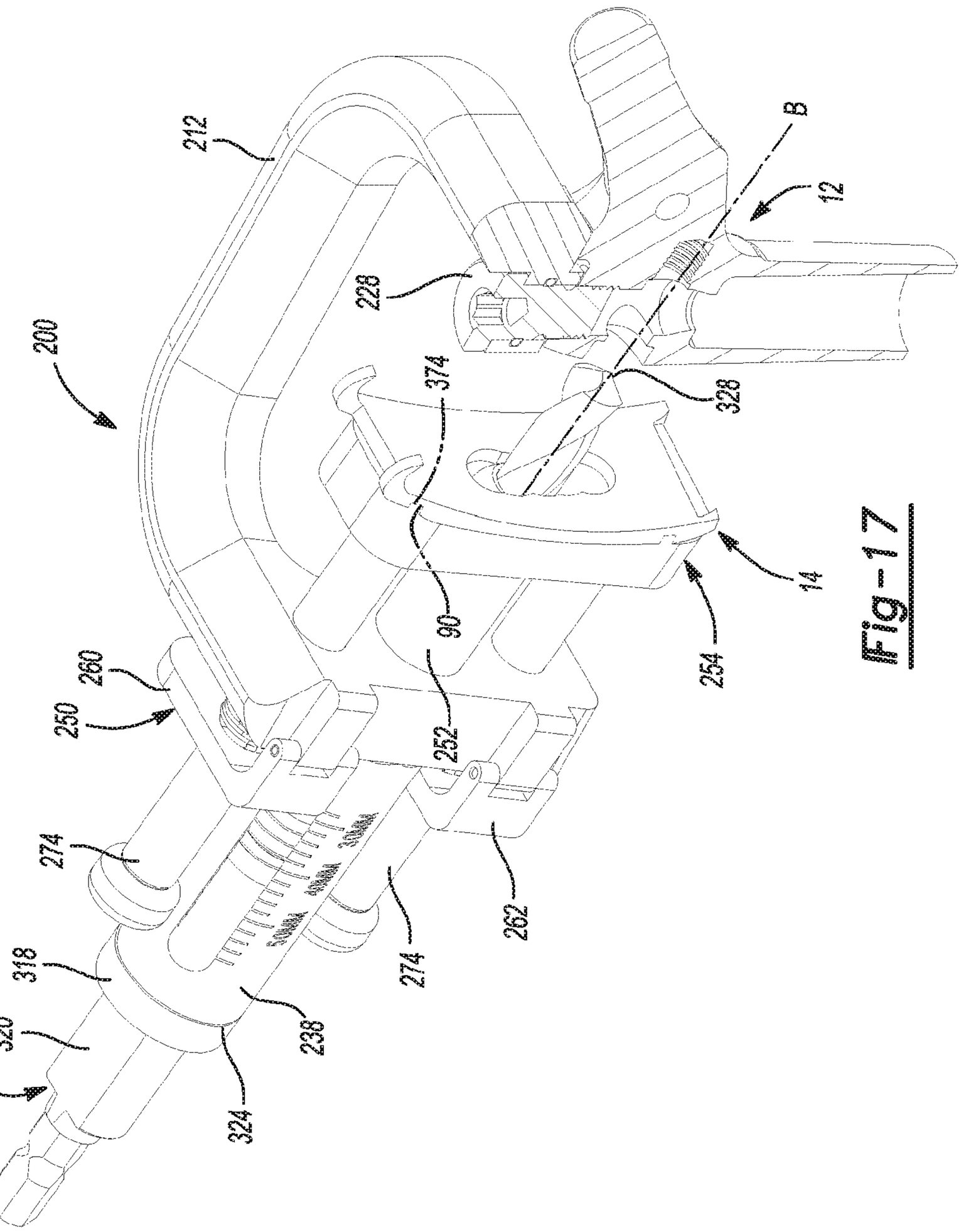

212
8
12
228
200
374
328
90
14
254
260
250
252
274
262
318
274
320
316
324
238

Fig-17

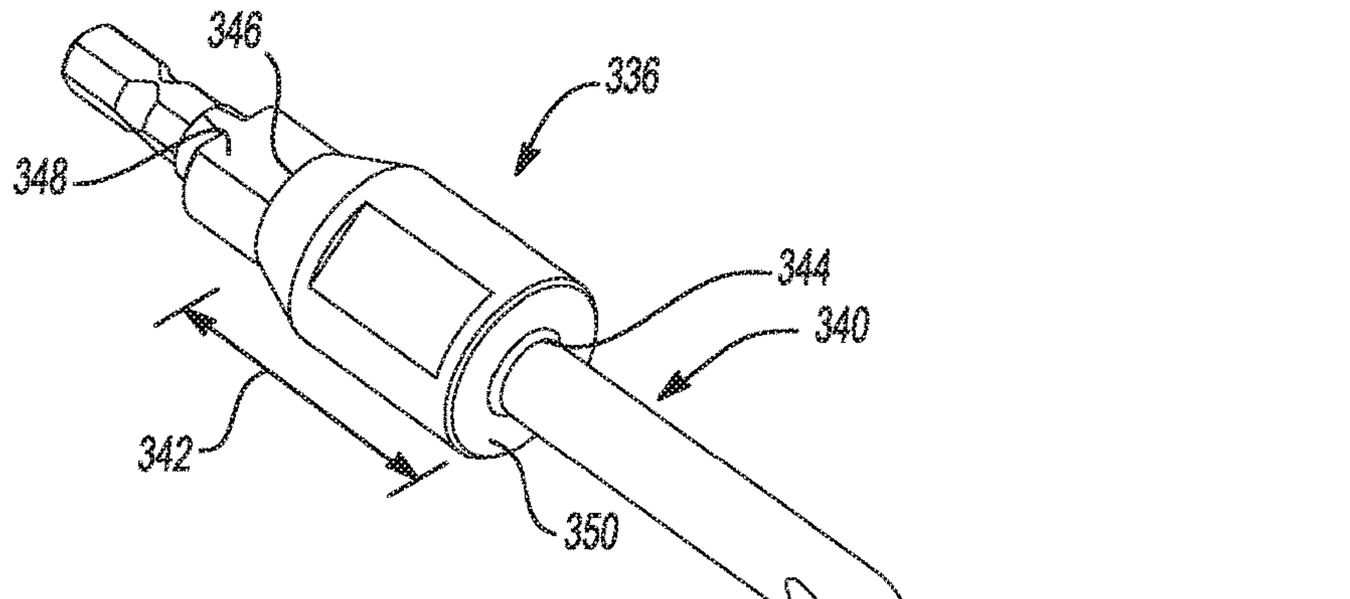

346
336
348
344
340
342
350

Fig-18

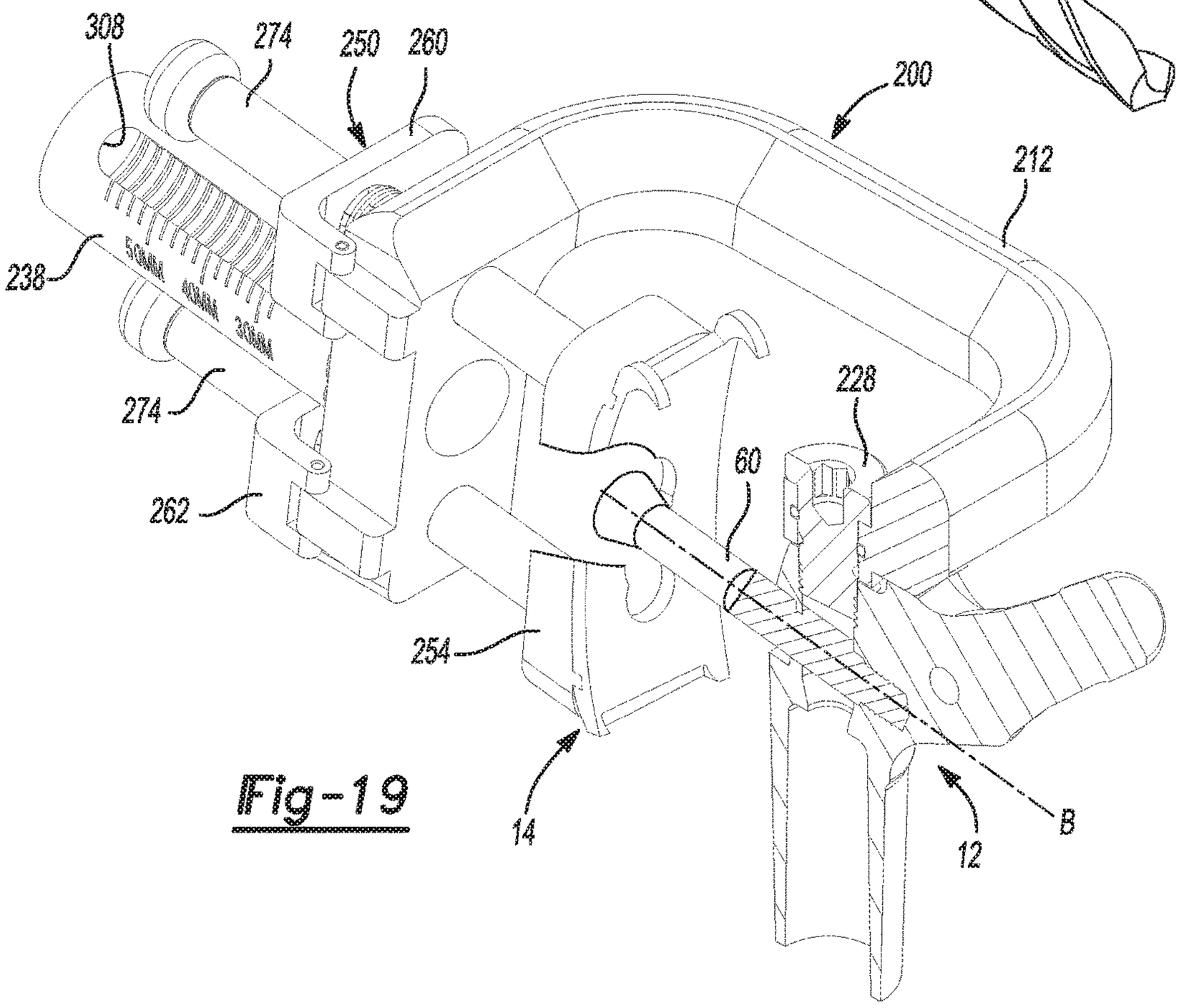

308
274
250
260
200
212
238
274
228
60
262
254
14
12
B

Fig-19

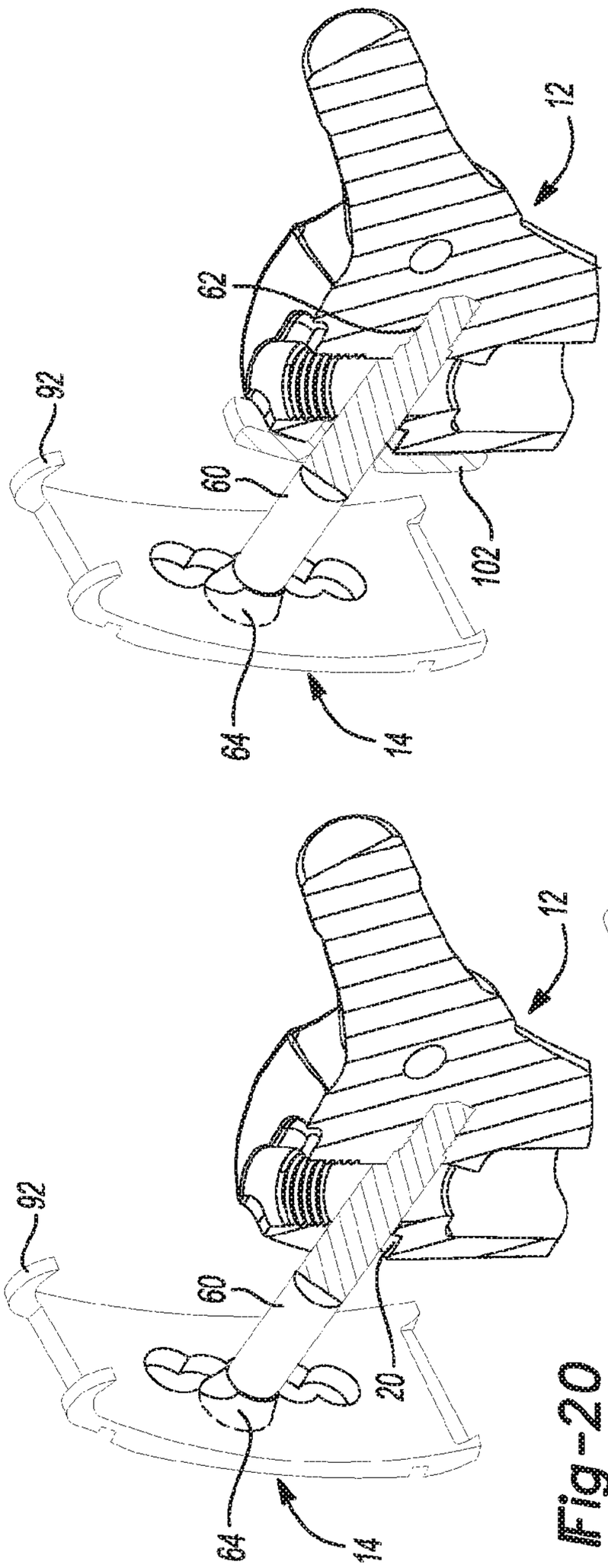


Fig-20A

Fig-20

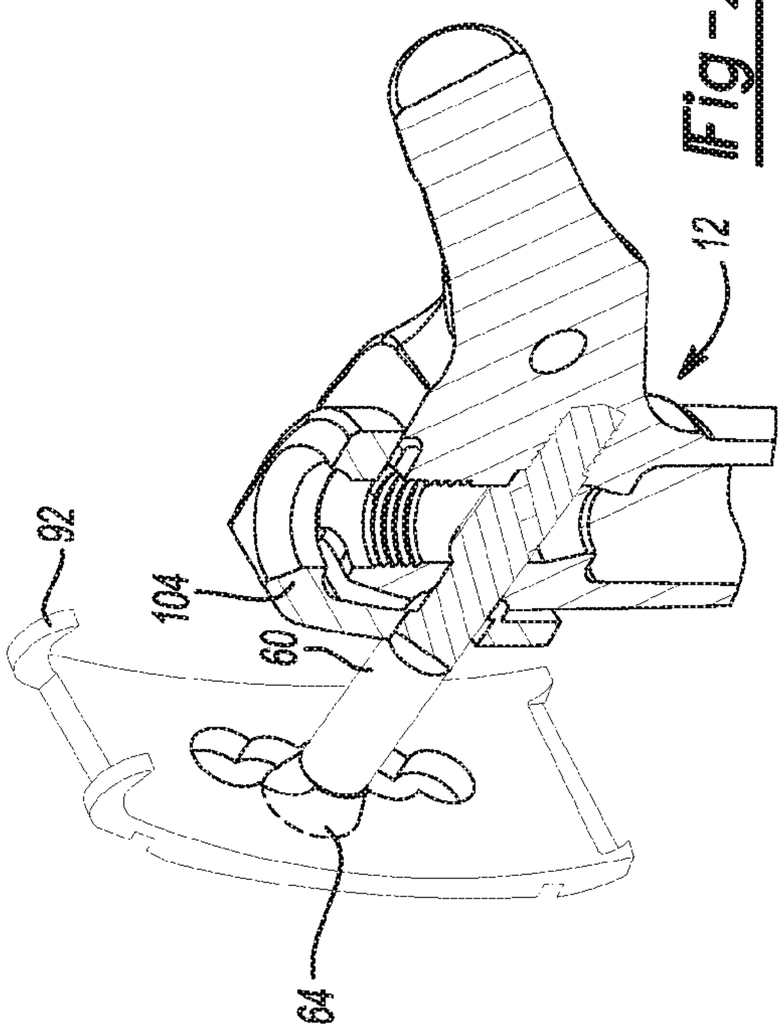
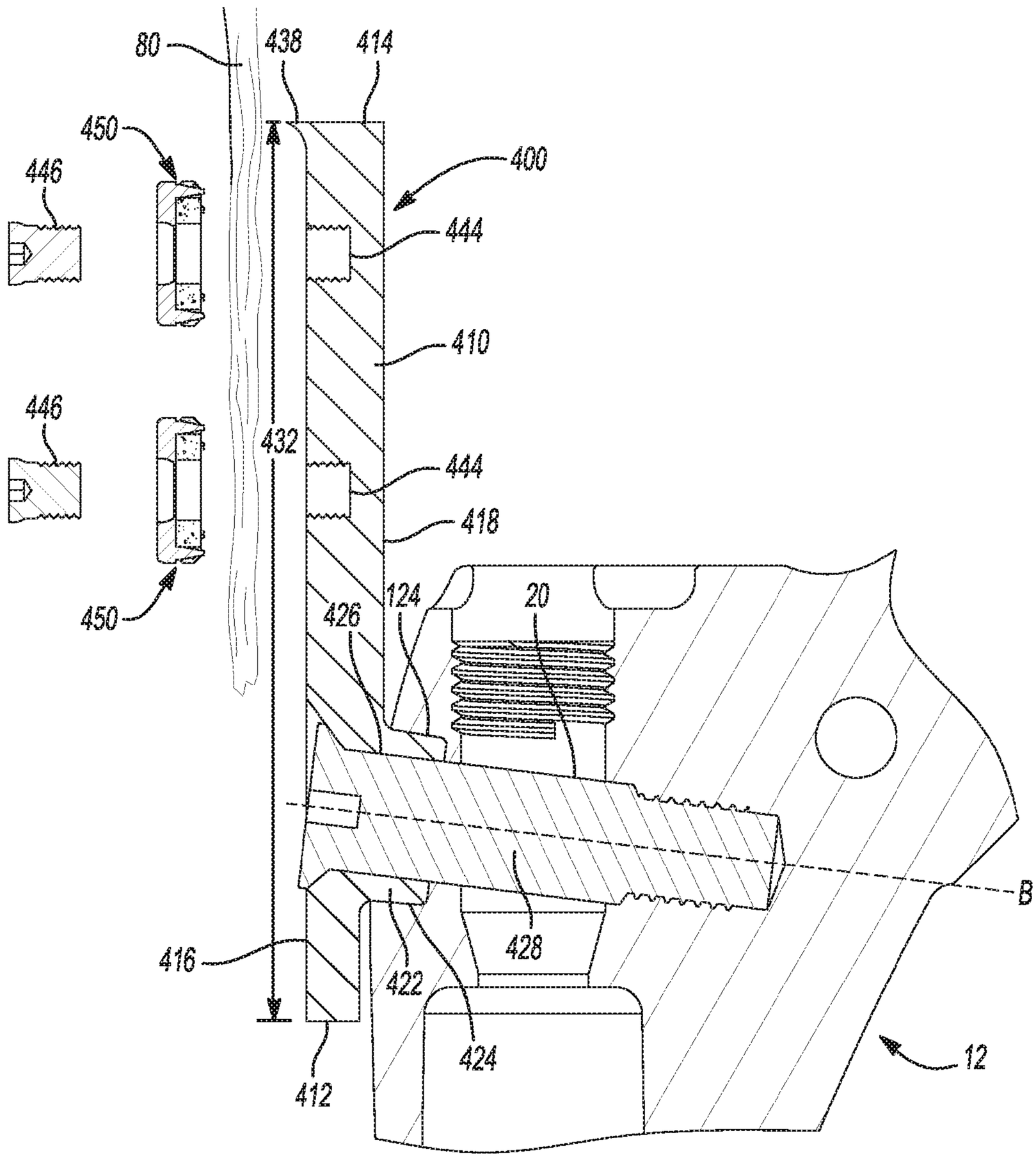


Fig-20B


80
438
414
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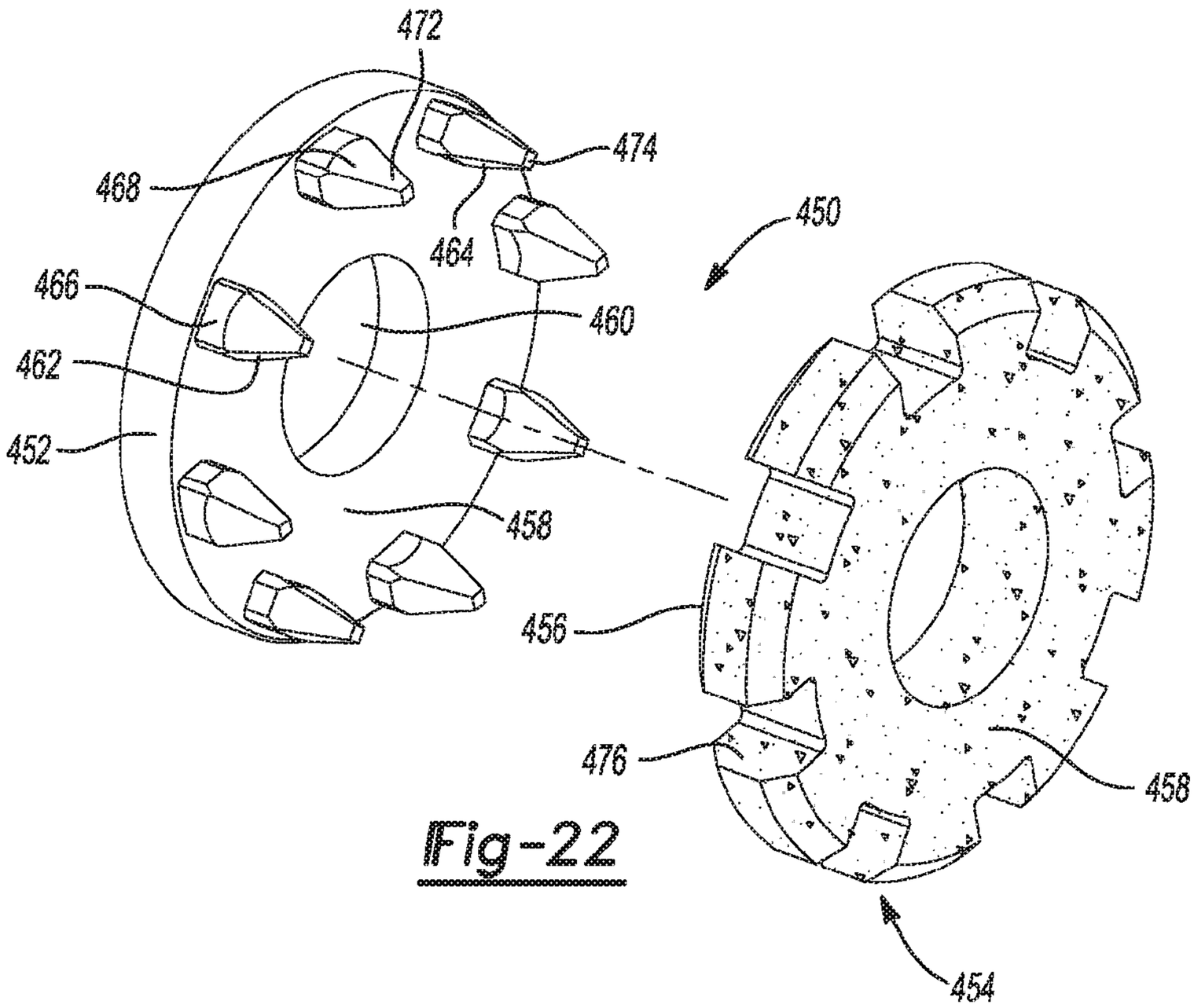
446
400
444
410
446
432
444
418
450
124
20
426
B
428
416
422
424
412
12

Fig-21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474
468
464
466
460
462
452
458
450
456
476
458
454

Fig-22

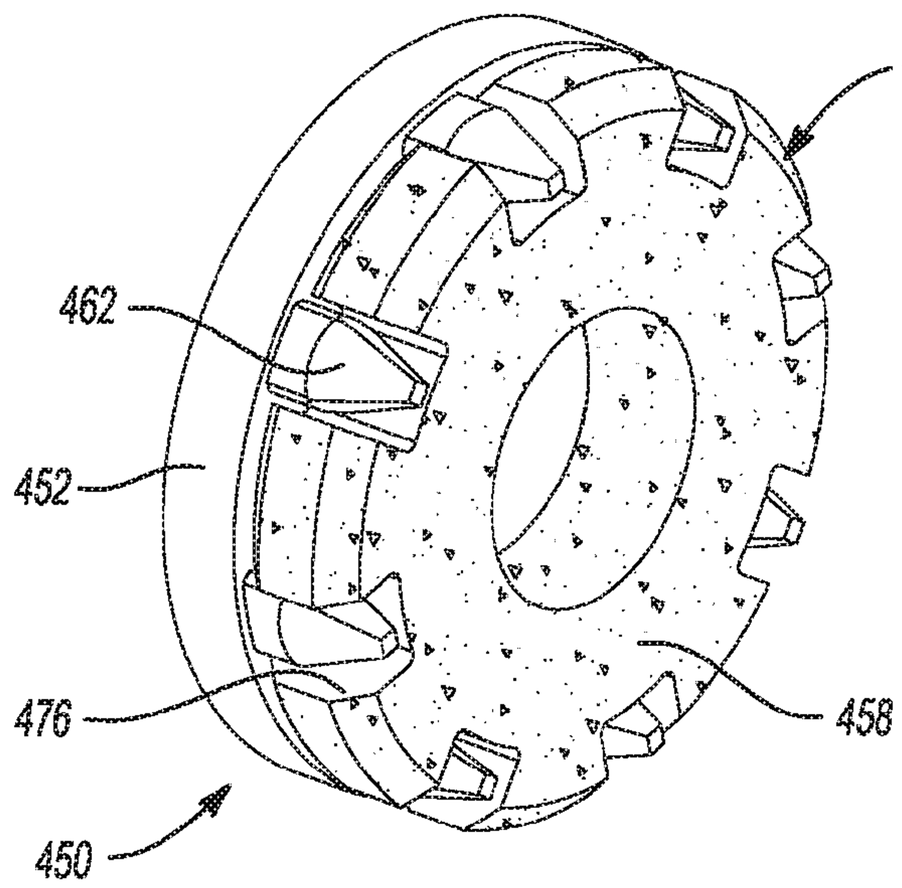
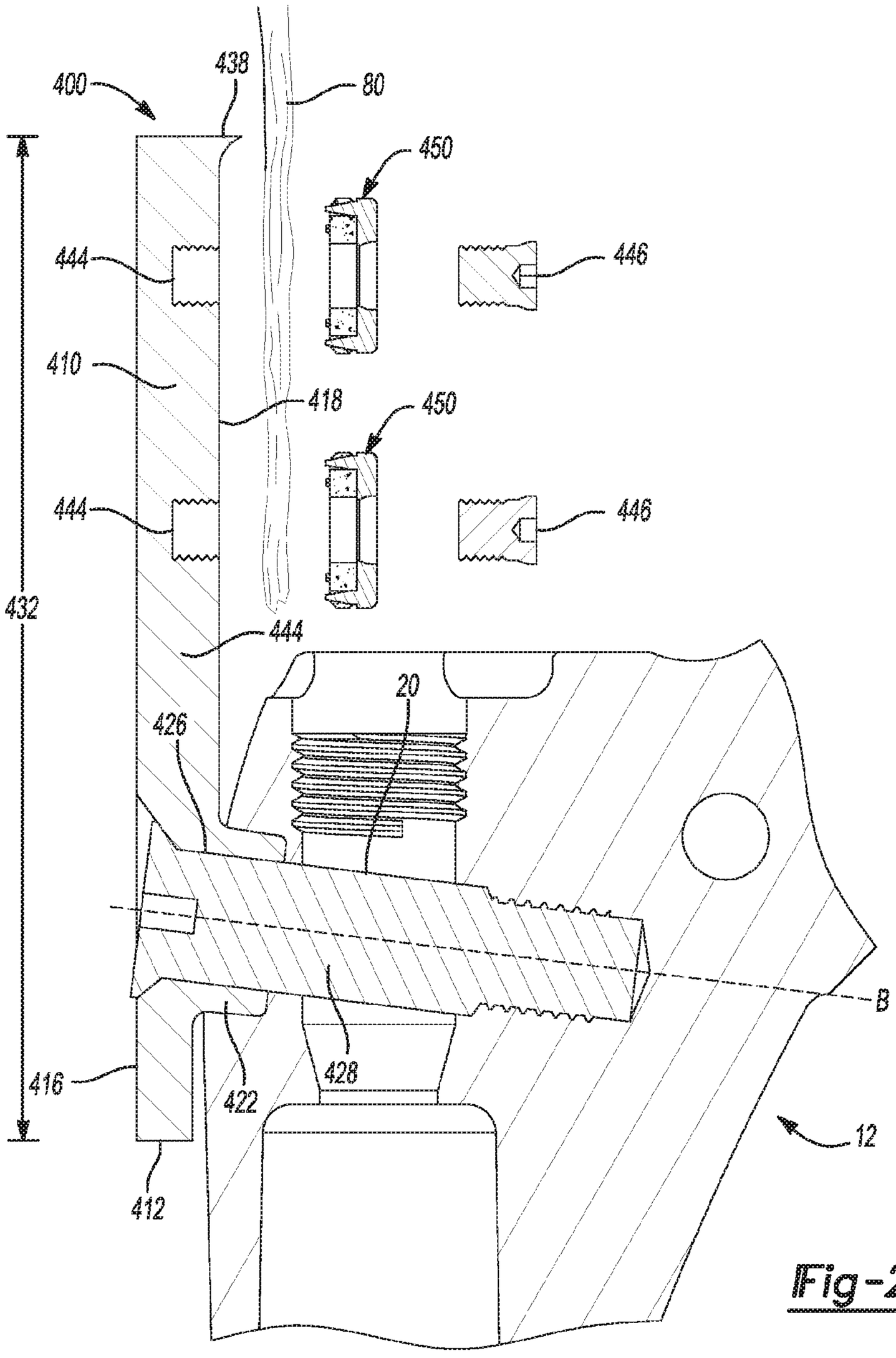

454
462
452
476
458
450

Fig-23


400
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412

Fig-24

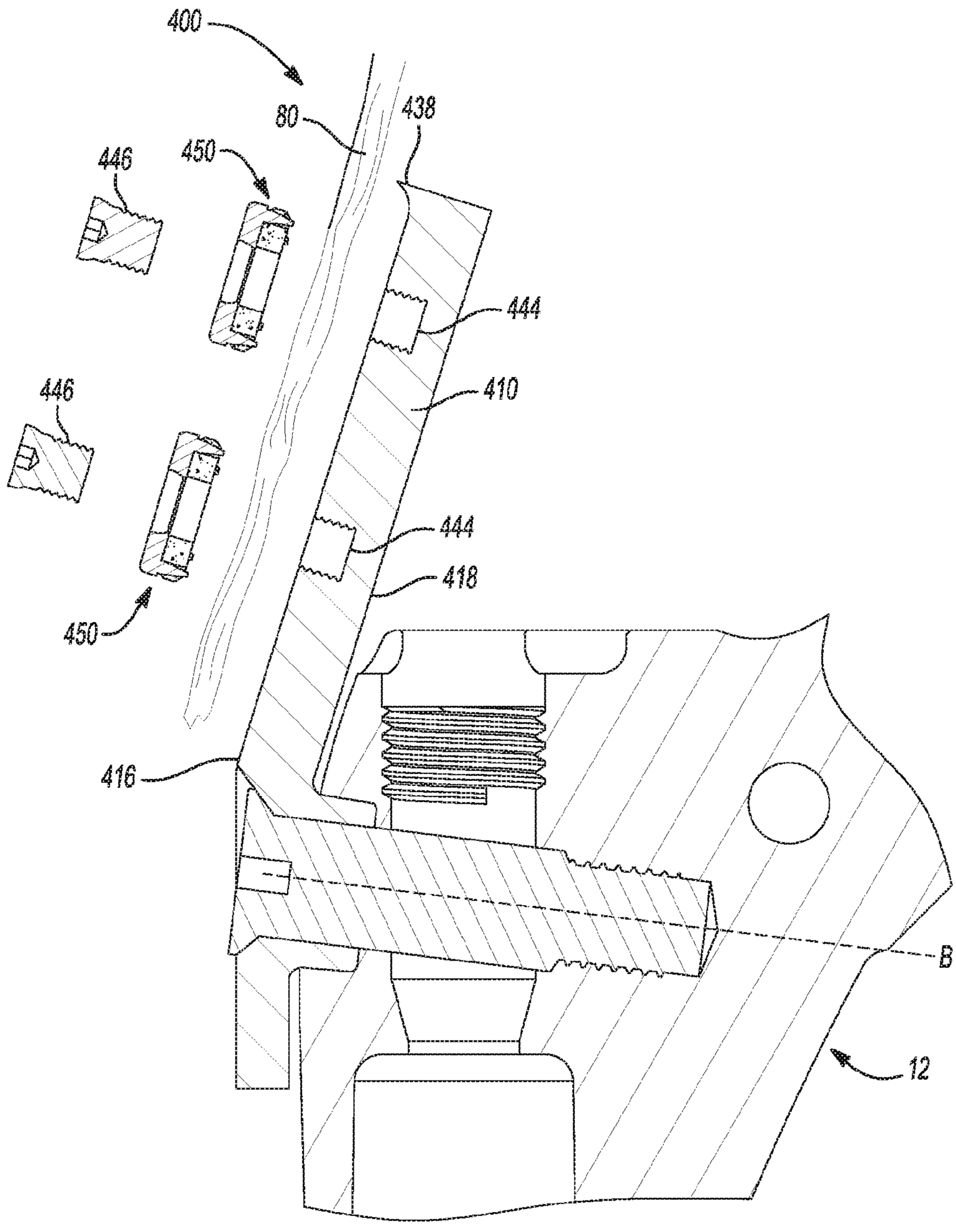

Fig-25

MODULAR LATERAL HIP AUGMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 14/563,118, filed on Dec. 8, 2014, now U.S. Pat. No. 9,510,950, which is a divisional of U.S. patent application Ser. No. 13/913,858, filed on Jun. 10, 2013, now U.S. Pat. No. 8,906,109, which is a divisional of U.S. patent application Ser. No. 12/718,230, filed on Mar. 5, 2010, now U.S. Pat. No. 5,460,393. The entire disclosure(s) of (each of) the above application(s) is (are) incorporated herein by reference.

This application is also related to U.S. patent application Ser. No. 12/718,018, now U.S. Pat. No. 8,221,432, issued Jul. 17, 2012, entitled "METHOD AND APPARATUS FOR IMPLANTING A MODULAR FEMORAL HIP;" U.S. patent application Ser. No. 12/718,023, entitled "GUIDE ASSEMBLY FOR LATERAL IMPLANTS AND ASSOCIATED METHODS;" U.S. patent application Ser. No. 12/718,026, entitled "REVISION BROACH WITH SMOOTH LATERAL SIDE;" U.S. patent application Ser. No. 12/718,027, now U.S. Pat. No. 8,419,743, issued Apr. 16, 2013, entitled "ASSEMBLY TOOL FOR MODULAR IMPLANTS AND ASSOCIATED METHOD;" and U.S. patent application Ser. No. 12/718,031, now U.S. Pat. No. 8,333,807, issued Dec. 18, 2012, entitled "METHOD AND APPARATUS FOR TRIALING AND IMPLANTING A MODULAR FEMORAL HIP;" each filed concurrently with U.S. patent application Ser. No. 12/718,230, filed on Mar. 5, 2010. The disclosures of each of the above applications are incorporated herein by reference.

FIELD

The present teachings relate generally to lateral augment implants for use with a hip implant.

BACKGROUND

The statements in this section merely provide background information related to the present disclosure and may not constitute prior art.

In many reconstructive procedures of the hip joint, the greater trochanter can sometimes be resected from the proximal femur to provide access to the joint or a primary hip prosthesis, such as during a revision hip replacement procedure. The resected portion of the greater trochanter can be reattached after a revision femoral prosthetic component is implanted using, for example, bolts, wires, nails, etc. either alone or in combination. The greater trochanter may also fracture unintentionally during the insertion of a prosthetic implant and may require reattachment. Further, the greater trochanter may need to be partially resected and/or may include bone loss due to, for example, wear over time. In such circumstances, the greater trochanter may require additional support to compensate for the area of bone loss.

There is, therefore, a need for improved implants and associated guide instruments that facilitate lateral access to a hip prosthesis and allow easy alignment, insertion and removal of trochanteric bolts.

SUMMARY

This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

In one form, an implant for a hip is provided and can include a lateral augment adapted to be coupled to a lateral side of a femoral body implant. The lateral augment can include a body portion having a first surface, a second surface opposite the first surface, and a protrusion extending from the second surface. The protrusion can have a shape adapted to mate with a complementary shaped recess formed in the lateral side of the proximal femoral body implant. The lateral augment can further include an aperture and a fastener received through the aperture. The aperture can be positioned in the body portion and extend through the protrusion such that the aperture is adapted to be coaxially aligned with the lateral bore in the femoral body implant. The fastener can be adapted to be threadably secured to the lateral bore and configured to have a length sufficient to pass through a portion of a greater trochanter for securing the portion of the greater trochanter and the lateral augment to the femoral body implant.

In another form, an implant for a hip is provided and can include a lateral augment adapted to be coupled to a lateral side of a proximal femoral body implant. The lateral augment can include a body portion having a first surface and a second surface opposite the first surface and adapted to be positioned adjacent to the lateral side of the proximal femoral body implant such that a portion of the body portion extends beyond a proximal end of the proximal femoral body implant. An aperture can be positioned in the body portion at a proximal region and extend through the body portion. At least one bore can be positioned in the body portion and be spaced apart from the aperture and adapted to be above a proximal end of the proximal femoral body implant when the lateral augment is coupled thereto. The implant can further include a first fastener configured to be received in the bore of the body portion and adapted to secure soft tissue thereto, and a ligament washer can be received by the first fastener and have at least one soft tissue engagement member adapted to engage the soft tissue. A second fastener can be received through the aperture and can be adapted to be threadably secured to a lateral bore in the proximal femoral body implant.

Further areas of applicability will become apparent from the description provided herein. It should be understood that the description and specific examples are intended for purposes of illustration only and are not intended to limit the scope of the present teachings.

DRAWINGS

The present teachings will become more fully understood from the detailed description, the appended claims and the following drawings. The drawings are for illustrative purposes only and are not intended to limit the scope of the present disclosure.

FIG. **1** is an exploded sectional view of an exemplary implant according to the present teachings;

FIG. **2** is a sectional environmental view of the implant of FIG. **1** according to the present teachings;

FIG. **3**A is a sectional environmental view of the implant of FIG. **1** with an exemplary lateral augment according to the present teachings;

FIG. **3**B is a sectional environmental view of the implant of FIG. **1** with another exemplary lateral augment according to the present teachings;

FIG. **4** is a perspective view of an implant body with an exemplary lateral augment according to the present teachings;

FIG. **5** is a sectional view of FIG. **4** according to the present teachings;

FIG. **6**A is a medial perspective view of the exemplary lateral augment of FIG. **4** according to the present teachings;

FIG. **6**B is a lateral view of the exemplary lateral augment of FIG. **4** according to the present teachings;

FIG. **7** is a perspective view of an implant body with an exemplary lateral augment according to the present teachings;

FIGS. **8**A and **8**B are lateral and medial perspective views of the exemplary lateral augment of FIG. **7** according to the present teachings;

FIG. **9** is a sectional view of FIG. **7** according to the present teachings;

FIGS. **10** and **10**A are perspective views of an exemplary guide assembly with a left-handed outrigger coupled to an associated implant according to the present teachings;

FIG. **11** is perspective view of a removable sleeve of the guide assembly of FIG. **10** according to the present teachings;

FIG. **12** is a perspective view of a support pad of the guide assembly of FIG. **10** according to the present teachings;

FIG. **13** is a perspective view of the left-handed outrigger according to the present teachings;

FIG. **14** is a partial perspective view of the guide assembly of FIG. **10** according to the present teachings;

FIGS. **15-20**B are sequential perspective views of the exemplary guide assembly illustrating use of the guide assembly in various stages of engagement and with alternative combinations of implants according to the present teachings;

FIG. **21** is a sectional view of an alternative implant assembly according to the present teachings;

FIG. **22** is an exploded perspective view of a ligament washer of implant assembly of FIG. **21** according to the present teachings;

FIG. **23** is a perspective view of an exemplary assembled configuration of the ligament washer of FIG. **22** according to the present teachings;

FIG. **24** is a sectional view of an alternative configuration of the implant assembly of FIG. **21** according to the present teachings; and

FIG. **25** is a sectional view of another alternative configuration of the implant assembly of FIG. **21** according to the present teachings.

DETAILED DESCRIPTION

The following description is merely exemplary in nature and is not intended to limit the present disclosure, its application, or uses. It should be understood that throughout the drawings, corresponding reference numerals indicate like or corresponding parts and features. In particular, the guide assembly of the present teachings can be used with any type of prosthesis for a bone, such as, for example, a proximal or distal femur, a proximal or distal tibia, a proximal or distal humerus, etc. Similarly, the lateral implants can include various types of implants such as, for example, a lateral augment or a claw plate, or combinations thereof. Therefore, it will be understood that the following discussions are not intended to limit the scope of the appended claims.

Referring initially to FIGS. **1** and **2**, an exemplary implant **10** according to the present teachings can include a proximal femoral body implant **12** and a lateral support implant or claw plate **14**. The proximal femoral body **12** can define a longitudinal bore **16** extending from a proximal end **18** along a longitudinal axis A and a blind bore **20** extending from a lateral side **22** towards a medial side **24** without surfacing on medial side **24** and having a longitudinal axis B. Blind bore **20** can be positioned at an acute angle α relative to longitudinal axis A. While blind bore **20** is shown as extending at an acute angle relative to longitudinal axis A, it should be appreciated that angle α can include various angles as may be desirable for different femoral body implant configurations. Bore **20** can include a threaded portion **26** and longitudinal bore **16** can also include a threaded portion **28** adjacent proximal end **18**.

Proximal femoral body **12** can also include a neck portion **34** and a distal end **36** having a bore **38**. Neck portion **34** can include a distal end **40** for receiving a spherical femoral head **42** that can mate with an acetabular cup **44**, as shown in FIGS. **1** and **2**. The femoral head **42** can be coupled to the neck portion **34** with a tapered connection, such as a Morse taper connection. Distal end bore **38** can include a female tapered configuration **46** that is configured to matingly receive a corresponding proximal male tapered end **50** of a distal stem extension **52** of implant **10**. Tapered end **50** can include a blind threaded bore **54** configured to receive fastener **56** therein.

The implant **10** can further include a lateral fastener, such as a trochanteric bolt **60**, having a threaded end **62** and a head **64**. Trochanteric bolt **60** can be inserted into the lateral blind bore **20** from a lateral side **68** of the femur **70** through a lateral bore **72** drilled into femur **70**. Lateral bore **72** can be coaxial with blind bore **20** and can be drilled into femur **70** using guide assembly **200** of FIG. **10**, as will be described in more detail below. The threaded end **62** of trochanteric bolt **60** can engage threaded portion **26** of blind bore **20**.

The claw plate **14** can be implanted laterally in soft tissue **80** adjacent to the femur **70** with the assistance of the guide assembly **200**, as will also be described below in greater detail. Claw plate **14** can be used to provide support for soft tissue and/or a bone fragment, such as a portion **84** of a greater trochanter that has been broken off or resected, which may be required during a revision hip replacement procedure. The claw plate **14** can be retained in position by the head **64** of trochanteric bolt **60**, with the head **64** being received in a countersunk bore **88** of claw plate **14**, as shown in FIGS. **1-3**. The claw plate **14** can have a variety of shapes depending on the particular application and can also be anatomically configured so as to have a shape that substantially conforms to the shape of the lateral side **68** of the femur **70** or the greater trochanter bone portion **84**. The claw plate **14** can also include anchors or soft tissue piercing spikes **92** for soft tissue attachment.

With particular reference to FIG. **2**, the proximal femoral body **12** can be coupled to the distal stem extension **52** with a Morse taper connection **96** such that the tapered proximal end **50** of the stem extension **52** is press fitted into the tapered distal bore **38** of proximal femoral body **12**. The proximal femoral body **12** can be at least partially received in an intramedullary canal **98** of the femur **70**. The distal stem extension **52** can also be locked to the proximal body **12** by fastener **56** being received in longitudinal bore **16** of proximal body **12** and engaging threaded bore **54** of stem extension **52**. The proximal femoral body **12** and distal stem **52** can be implanted using a minimally invasive procedure or technique through a small anterior or posterior incision adjacent the left or right femur.

Referring additionally to FIGS. **3-9**, implant **10** can also include lateral augments, such as lateral augments **102**, **104**, as may be required during a revision hip replacement procedure to provide for proper trochanter attachment. For

example, if a portion of the greater trochanter needs to be resected and/or removed during a revision hip procedure to provide for removal of a primary hip implant, the augments **102**, **104** can act as spacers to provide appropriate adjustment for the location of attachment of the trochanter to the proximal femoral body **12**, as shown for example in FIG. **3**A. The lateral augments **102**, **104** can also be used during a revision hip replacement procedure to compensate for any bone loss adjacent the lateral side of the hip implant.

With particular reference to FIGS. **3**A-**6**B, lateral augment **102** can include a substantially T-shaped configuration **108** having a body portion **110** with a lateral bone engaging surface **112** and a medial implant facing surface **114**, and a cylindrical or tubular portion **118** extending from medial surface **114**. Tubular portion **118** can include a tapered exterior surface **120** configured to be received in a mating tapered counterbore **124** formed into proximal femoral implant body **12**, as generally shown in FIG. **5**. The tapered exterior surface **120** and corresponding tapered counterbore **124** can be configured to provide a Morse taper connection **126** for coupling lateral augment **102** to proximal femoral body **12**. Augment **102** can include an aperture **130** extending through body portion **110** and tubular portion **118** for receiving trochanter bolt **60** to secure claw plate **14** and T-shaped augment **102** to proximal femoral body **12**, as generally shown in FIG. **3**A.

Lateral augment **102** can further include a generally arcuate shape **136** corresponding to a mating shape on lateral side **68** of proximal femoral body **12**. Lateral augment **102** can be configured with various lengths **138** and thicknesses **140**, as may be required to provide for appropriate trochanter positioning and attachment during the revision hip procedure discussed above. Lateral surface **112** can also be provided with a roughened or porous metal coating to enhance biologic fixation, such as a layer of Regenerex® porous titanium construct **142**, available from Biomet, Inc. of Warsaw, Ind. Alternatively, lateral augment **102** can be formed entirely out of porous metal.

Referring now to FIGS. **7-9**, lateral augment **104** can include an L-shaped configuration **150** with a lateral surface **152**, a medial surface **154**, a lateral portion **156** and a superior portion **158** extending from lateral portion **156**. Lateral surface **152** can include a layer of porous metal coating, such as the layer of Regenerex® **142** discussed above and as generally shown in FIG. **8**A. In an alternative configuration, lateral augment **104** can be formed entirely out of porous metal. Lateral portion **156** can include a protrusion **160** extending from rear surface **154** and configured to engage a correspondingly shaped recess **162** in the proximal femoral body **12**, as shown in FIGS. **8**B and **9**.

A first aperture **164** can be provided in lateral portion **156** and a second aperture **166** can be provided in top portion **158** such that when the L-shaped augment **104** is positioned on proximal femoral body **12**, the first aperture **164** can be coaxially aligned with blind bore **20** and the second aperture **166** can be coaxially aligned with longitudinal bore **16**, as shown in FIG. **9**. Trochanter bolt **60** can be received through claw plate **14** and first aperture **164** and threadingly engaged with threaded bore **20** to couple claw plate **14** and lateral portion **156** to proximal femoral body **12**, as generally shown in FIG. **3**B. Second aperture **166** can receive a fastener **172** to secure superior portion **158** to proximal end **18** of proximal femoral body **12**.

Referring now to FIGS. **10-14**, and with continuing reference to FIGS. **1-9**, after the proximal femoral body **12** has been implanted, as well as the T-shaped or L-shaped lateral augments **102** or **104** attached as may be required, the claw plate **14** can be implanted using guide assembly **200**. In the exemplary application of a revision hip replacement, guide assembly **200** can provide for forming the lateral bore **72** and inserting the trochanteric bolt **60** therethrough and into engagement with the proximal femoral body **12** after the proximal body has been implanted in femur **70**.

Guide assembly **200** can include an exemplary left-handed outrigger **210** that can take the form of a C-shaped arm **212**, a leg or base portion **214** extending from a first or lateral end **218** of C-shaped arm **212**, and a bore **220** (FIG. **13**) extending through a second or medial end **222** of C-shaped arm **212**. Outrigger **210** can be sized to be substantially rigid so as to avoid misalignment due to bending or flexing, and can be configured with the C-shape **212** to avoid the abductor muscles **223** of the hip joint during implantation of the trochanter bolt **60**, claw plate **14** and one of the lateral augments **102**, **104**, if required. The left-handed outrigger **210** can be used laterally with anterior incisions of the left femur area or posterior incisions of the right femur area. It will be appreciated that while outrigger **210** is shown in FIG. **10** as well as all other applicable Figures in a "left-handed" configuration, the outrigger **210** can also be configured in a "right handed" configuration, which is a mirror image of the "left handed" outrigger **210**. The right-handed outrigger can be used laterally with anterior incisions of the right femur area and/or posterior incisions of the left femur area. Therefore, it will be understood that while the remaining description will focus on the left-handed outrigger **210**, the description is similarly applicable to the mirror-image right-handed outrigger.

Medial end **222** of C-shaped arm **212** can further include a slot-like protrusion **224** extending therefrom and configured to be received in a corresponding slot **226** positioned in proximal end **18** of femoral body **12**, as shown in FIGS. **10** and **13** with reference to FIG. **5**. The protrusion **224** can be used to align the guide assembly **200** to proximal femoral body **12** before coupling the C-shaped arm **212** thereto with a fastener **228**, as well as to serve as an anti-rotation feature. The base portion **214** can include a lateral side **232** and a medial side **234**, as well as a pair of parallel through bores **236** extending through base portion **214**, as shown for example in FIG. **13**. An alignment tube or sleeve **238** can be integrally formed with base portion **214** or modularly coupled thereto and can be coaxially aligned with another through bore **242** disposed in base portion **214**, as shown in FIGS. **10**, **10**A and **14**. When C-shaped arm **212** is coupled to proximal femoral body **12**, base portion **214** can be parallel to longitudinal axis A and alignment tube **238** can be coaxial with longitudinal axis B of blind bore **20**, as shown for example in FIG. **10**.

The guide assembly **200** can also include a quick release clamp system **250**, a removable sleeve **252**, and a support pad **254** that cooperates with the clamp system **250** and sleeve **252**. With particular reference to FIGS. **10**, **10**A and **14**, the quick-release clamp system **250** can include first and second clamp members **260**, **262** each pivotably coupled to base portion **214** via a hinge pin **264**. Each of the clamp members **260**, **262** can have an aperture **266** and an L-shaped configuration **270** that partially wraps around alignment tube **238**, as generally shown in FIG. **10**A. The apertures **266** can be co-axially aligned with respective through bores **236** in base portion **214** such that each respective aperture **266** and through bore **236** can slidably receive a cylindrical support rod **274** therethrough, as generally shown in FIGS. **10**, **13** and **14**. A coil spring **278** can

be coupled at one end to each clamp member **260**, **262** and at the other end to base portion **214**, as generally shown in FIGS. **10**A and **14**.

The coil springs **278** can have an inner diameter sufficient for receiving one of the supports rods **274** therethrough as well as have an uncompressed length and spring force sufficient to urge respective clamp members **260**, **262** away from base portion **214** to a first or locking position **272**. In position **272**, the clamp members **260**, **262** can be positioned at a non-perpendicular angle relative to a longitudinal axis **276** of the cylindrical support rods **274**, as generally shown in FIG. **10**A. In this configuration, an inner surface **284** of apertures **266** can be misaligned with an exterior surface **286** of each support rod **274** so as to impinge on the support rods via the biasing force imparted by springs **278**. The biasing force and resulting impingement of clamp members **260**, **262** on support rods **274** serves to hold each support rod **274** in a desired fixed axial position.

To adjust a position of support rods **274** relative to clamp members **260**, **262** and base portion **214**, a user can depress or urge clamp members **260**, **262** towards base portion **214** to a second or release position **280**. In the second position **280**, clamp members **260**, **262** can be perpendicular or substantially perpendicular with longitudinal axis **276** and inner surfaces **284** of apertures **266** can be aligned with support rods **274**. In this configuration, support rods **274** can be slidably axially translated relative to the respective clamp member **260**, **262** to a desired position and then the respective clamp member **260**, **262** can be released. Once released, springs **278** can urge clamp members **260**, **262** from the second position **280** to the first position **272** where the clamp members impinge on support rods **274** so as to maintain the rods in the new or desired axially fixed position. It should be appreciated that while the above discussion of the quick-release clamp system **250** generally described clamp members **260**, **262** being simultaneously moved from the first to second positions, each of the clamp members **260**, **262** are separate components that can be used to individually or simultaneously adjust and lock a position of a corresponding support rod **274**. Such individual adjustment of each support rod **274** can be used, for example, to align support pad **254** flush against claw plate **14**, which can be at various angular orientations relative to the anatomy and longitudinal axis B.

With particular reference to FIGS. **10-11**, the removable sleeve **252** can include a first end **290**, a second end **292** and an internal longitudinal bore **294** extending through sleeve **252**. The removable sleeve **252** can be received in alignment tube **238** so as to be coaxial therewith and can include an external threaded portion **296** configured to threadingly engage an internal threaded portion **300** of alignment tube **238**, as generally shown in FIGS. **10** and **11**. First end **290** of removable sleeve **252** can also include an engagement or drive portion, such as slot **302**, configured to receive a driving tool (not shown) to advance or retract threaded sleeve **252** relative to alignment tube **238**. The removable sleeve **252** can be advanced relative to alignment tube **238** to have second end **292** engage the claw plate **14** against the soft tissue before the trochanteric bolt **60** is implanted. The removable sleeve **252** can further include a suitable marking, such as scribe line **306**, that can be visible through a window **308** in alignment tube **238**. The alignment tube **238** can also include a measurement index or indicia, such as a plurality of trochanteric bolt **60** or fastener length designations **310**, positioned adjacent the window **308** such that scribe line **306** can be correlated to one of the length designations **310**, as will be described in greater detail below.

The removable sleeve **252** can receive a trephine or drill **316** in longitudinal bore **294** so as to align and guide drill **316** (FIG. **17**) in forming lateral bore **72**. Drill **316** can include a stop member, such as an annular collar **318**, positioned on a body **320** of drill **316** configured to abut a first end **324** of alignment tube **238** when drill **316** is inserted into alignment tube **238** and removable sleeve **252**, as will be described in greater detail below. The collar **318** can be positioned relative to a tip **328** of drill **316** such that a desired drill depth is achieved when collar **318** abuts alignment tube **238** during a procedure. It should be appreciated that drill **316** can include a plurality of drills **316** each with collar **318** positioned at various distances relative to tip **328** to correspond with different desired drill depths, as may be required, for example, by different size femoral implants **12** and/or the use of lateral augments **102**, **104**.

In an alternative configuration, and with additional reference to FIG. **18**, a spacer sleeve **336** can be used as an alternative to the above described drill stop member arrangement. More specifically, as an alternative to using various drills **316** each with a differently positioned collar **318** corresponding at least to different implant configurations, one drill **340** can be used along with a plurality of different spacer sleeves **336**, where each spacer sleeve **336** has a length **342** corresponding to a desired drill depth for the various implant configurations. Spacer sleeve **336** can include a longitudinal bore **344** configured to receive drill **340**, a first end **346** arranged to abut portion **348** of drill **340**, and a second end **350** configured to abut alignment tube **238** to serve as a stop to limit the drill depth to the predetermined amount that corresponds to the selected spacer sleeve **336**.

With particular reference to FIG. **12**, and continued reference to FIGS. **10-14**, the support pad **254** can include a generally rectangular shape **360**, an aperture **362** for slidably receiving removable sleeve **252** therethrough, and retention slots **364**. The support pad **254** can be removable received on circular or spherical engagement members **368** positioned on respective ends of support rods **274**. The retention slots **364** can include a generally cylindrical shape **370** with an arcuate surface or periphery **372** that extends for greater than 180 degrees such that the slots **364** can capture the engagement members **368** and couple support pad **254** to support rods **274**. As one of ordinary skill in the art will appreciate, the circular or spherical engagement members **368** provide for the ability to orientate the support pad **254** in various angular orientations relative to the support rods **274**.

Referring to FIGS. **15-20**B, and with continuing reference to FIGS. **1-3**B, a procedure for inserting the claw plate **14**, trochanteric bolt **60** and lateral augments **102** or **104**, as may be required, will now be described. Although the procedure is illustrated with respect to the left-handed outrigger **210**, it should be appreciated that the procedure is similarly applicable to the right-handed outrigger discussed above. It should also be appreciated that the bone and soft tissue are not illustrated in FIGS. **16-20**B so as to not obscure the illustration of the guide assembly **200**. Reference is made to FIGS. **1-3**B and **15** for illustration of the bone and soft tissue.

With the proximal femoral body **12** implanted, one of the lateral augments **102**, **104** can be secured to the lateral side of femoral body **12**, as may be required to provide proper positioning of the greater trochanter relative to proximal femoral body **12** and to account for the above noted bone loss. The outrigger **210** can be coupled to the proximal end **18** of proximal femoral body **12** and secured with fastener **228**. Once coupled, alignment tube **238** can be coaxially aligned with blind bore **20**, as shown in FIG. **15**. The claw

plate **14** can then be implanted and compressed against soft tissue **80** adjacent the femur **70** by advancing removable sleeve **252** such that second end **292** engages claw plate **14**, as generally shown in FIGS. **16-17** with reference to FIGS. **1-3**B. It should be appreciated that claw plate **14** can be adjusted superiorly or inferiorly relative to longitudinal axis B, as may be required based on various anatomical conditions. A suitable driver (not shown) can be coupled to the first end **290** of removable sleeve **252** so as to engage slot **302** and assist in advancing removable sleeve **252** to compress claw plate **14**.

Once claw plate **14** is compressed with removable sleeve **252**, clamp members **260**, **262** can be independently depressed to release support rods **274**. Support rods **274** can then be individually or simultaneously translated forward to engage support pad **254** with claw plate **14**, as shown in FIGS. **16-17**. Support pad **254** includes a smooth engagement surface **255** for engaging claw plate **14**; however, support pad **254** can alternatively include projections **374** that engage slots **90** in claw plate **14**, as also shown in FIG. **17**. Once support pad **254** is engaged with claw plate **14**, clamp members **260**, **262** can be released thereby maintaining the position and support rods **274** and thus support pad **254**.

With additional reference to FIGS. **17-18**, the appropriately sized drill **316** corresponding to the implanted femoral body **12** and lateral augment **102**, **104**, if used, can be inserted into longitudinal bore **294** of removable sleeve **252** to drill the lateral bore **72** into the femur **70** from the lateral side **68**. The drill **316** can be advanced until collar **318** engages alignment tube **238**, as shown in FIG. **17**. Alternatively, drill **340** could be used with an appropriately selected spacer sleeve **336** to form the lateral bore **72**.

Once bore **72** is formed, drill **316** or **340** can be removed from sleeve **252** and an appropriate trochanteric bolt length can be determined by correlating the scribe line **306** with the length designations **310** on alignment tube **238**. The length designation **310** aligned with scribe line **306** can correspond to the appropriate trochanteric bolt **60** length required to secure claw plate **14** to blind bore **20** while taking into account the thickness of bone and/or soft tissue being compressed by claw plate **14**. It should be noted that the appropriate fastener length can also be determined before bore **72** is formed, such as after claw plate **14** is compressed by advancing removable sleeve **252**.

With the appropriate trochanteric bolt length determined by selecting a bolt length corresponding to the length designation **310** aligned with scribe line **306**, sleeve **252** can be removed from alignment tube **238** while support pad **254** continues to compress claw plate **14** in place via support rods **274**, as generally shown in FIG. **19**. The selected trochanteric bolt **60** can then be implanted by passing bolt **60** through alignment tube **238** and aperture **362** of support pad **254** such that threaded end **62** engages threaded portion **26** of blind bore **20**. Trochanteric bolt **60** can then be tightened such that head **64** engages and secures claw plate **14**, as generally shown in FIGS. **20-20**B with reference to FIG. **2-3**B. Once the trochanteric bolt **60** is implanted and secured, the guide assembly **200** can be removed from proximal femoral body **12**.

With additional reference to FIGS. **21-25**, an alternative lateral implant **400** for attaching the soft tissue **80** to proximal femoral body **12** will now be described. Lateral implant **400** can include a generally T-shaped plate member **410** having a proximal end **412**, a distal end **414**, a lateral surface **416** and a medial surface **418** opposite lateral surface **416**. The plate member **410** can include a tapered projection **422** extending from medial surface **418** and configured to be received in tapered counterbore **124** of proximal femoral body **12** and coupled thereto via a Morse taper connection **424**. An aperture **426** can be provided in plate member **410** extending through projection **422** so as to be coaxial with blind bore **20** when the tapered projection **422** is received in counterbore **124**, as generally shown in FIG. **21**. A fastener **428** can be received through aperture **426** and threadingly engaged to bore **20** to secure plate member **410** to proximal femoral body **12**, as generally shown for example in FIG. **21**.

Plate member **410** can be configured to have a length **432** such that proximal end **414** extends sufficiently beyond proximal end **18** of femoral body **12** so as to provide for adequate soft tissue **80** attachment and support. Plate member **410** can also include a layer of porous metal coating, or can alternatively be formed entirely of porous metal. A pair of threaded blind bores **444** can be provided in plate member **410** extending from front surface **416**. Bores **444** can be configured to receive a corresponding pair of fasteners **446** for securing soft tissue **80** to a lateral side of plate member **410**, as generally shown in FIG. **21**. Proximal end **414** can also include an attachment member, such as a sharp projection or tooth **438**, to assist in attaching and retaining soft tissue **80**.

In an alternative configuration, plate member **410** can include blind bores **444** extending from the medial surface **418**, as generally shown in FIG. **24**. In this configuration, the soft tissue **80** would be compressed against the medial surface of plate member **410**, as also shown in FIG. **24**. In another alternative configuration, plate member **410** can be angled so as to align with a force generated by the soft tissue, as generally shown in FIG. **25**.

Lateral implant **400** can also include ligament washers **450** for use with fasteners **446**. Each ligament washer **450** can include a body portion **452** and an optional insert **454** configured to abut body portion **452**, as shown in FIGS. **22-23** and generally described in commonly owned co-pending application Ser. No. 12/398,548, entitled "Method and Apparatus for Attaching Soft Tissue to an Implant," the entirety of which is hereby incorporated by reference herein. Body portion **452** can include a fastener engaging side **456**, a soft tissue facing side **458**, an aperture **460** and a plurality of circumferentially spaced ligament engagement members **462**. The soft tissue facing side **458** can be configured to engage the soft tissue **80** directly or receive insert **454**. Insert **454** can be configured to facilitate biologic fixation and can be coated with a layer of Regenerex® for such purpose. Alternatively, insert **454** can be formed entirely of porous metal. The plurality of bone engagement members **462** can each include a tapered configuration **464** formed with a base portion **466** attached to the soft tissue facing side **458** and a body portion **468** with multi-faceted side portions **472** that taper to a pointed distal tip **474**. Insert **454** can further include a plurality of peripheral cut-outs or recesses **476** corresponding to the plurality of engagement members **462** such that each engagement member **462** is received in a recess **476**, as generally shown in FIGS. **22-23**. In use, the ligament washers can be received on fasteners **446** such that the insert **454** and engagement members **462** contact the soft tissue when the fasteners are secured to plate member **410**, as shown in FIGS. **21** and **24-25**.

While one or more specific examples have been described and illustrated, it will be understood by those skilled in the art that various changes may be made and equivalence may be substituted for elements thereof without departing from the scope of the present teachings as defined in the claims. Furthermore, the mixing and matching of features, elements

and/or functions between various examples may be expressly contemplated herein so that one skilled in the art would appreciate from the present teachings that features, elements and/or functions of one example may be incorporated into another example as appropriate, unless described otherwise above. Moreover, many modifications may be made to adapt a particular situation or material to the present teachings without departing from the essential scope thereof.

What is claimed is:

1. A femoral implant for a hip, comprising:

a proximal femoral body implant comprising:

a proximal femoral body portion;

a distal stem coupled to the proximal femoral body portion; and

a femoral head coupled to a neck portion of the proximal femoral body portion;

a lateral plate having a T-shaped configuration coupled to a lateral side of the proximal femoral body implant, the lateral plate comprising:

a lateral surface and a medial surface configured to be positioned adjacent to at least the lateral side of the proximal femoral body implant, at least one of the medial and lateral surfaces of the lateral plate defining a soft tissue attachment surface;

a projection extending from the medial surface and being configured to mate with a recess formed in the lateral side of the proximal femoral body implant;

an aperture formed in the lateral plate and extending through the projection such that the aperture is configured to be coaxially aligned with a lateral bore formed in the proximal femoral body implant; and

at least one threaded bore extending from one of the lateral surface or the medial surface, the threaded bore being configured to receive a plate fastener for securing soft tissue to the lateral plate; and

an implant fastener configured to be received through the aperture and configured to be threadably secured to the lateral bore of the proximal femoral body implant to couple the lateral plate to the proximal femoral body implant, the fastener having a length sufficient to also pass through a portion of the femur for securing the portion of the femur to the lateral plate and the proximal femoral body implant,

wherein the recess is coaxial with the lateral bore formed in the proximal femoral body implant,

wherein the projection includes a tapered cylindrical portion and the recess includes a complementary shaped tapered counterbore adapted to receive the tapered cylindrical portion in a press fit configuration, and

wherein the lateral plate further comprises a proximal end adapted to extend a distance beyond a proximal end of the proximal femoral body implant, the proximal end of the lateral plate including a sharp projection configured to attach the lateral plate to the soft tissue.

2. The implant of claim **1**, wherein the at least one threaded bore includes at least two threaded bores, wherein each of the at least two threaded bores extend from the other of the lateral surface and the medial surface.

3. The implant of claim **1**, wherein the lateral plate is configured to be angled to align with a force generated by the soft tissue.

4. The implant of claim **1**, wherein the proximal end of the lateral plate includes an attachment member configured to attach the lateral plate to the soft tissue.

5. The implant of claim **4**, wherein the attachment member includes the lateral surface of the lateral plate.

6. The implant of claim **4**, wherein the attachment member includes the medial surface of the lateral plate.

7. The implant of claim **1**, wherein the lateral plate includes a layer of porous metal to enhance biologic fixation.

8. A femoral implant for a hip, comprising:

a proximal femoral body implant comprising:

a proximal femoral body portion;

a distal stem coupled to the proximal femoral body portion; and

a femoral head coupled to a neck portion of the proximal femoral body portion;

a plate fastener;

a lateral plate having a T-shaped configuration coupled to a lateral side of the proximal femoral body implant, the lateral plate comprising:

a lateral surface and a medial surface configured to be positioned adjacent to at least the lateral side of the proximal femoral body implant, at least one of the medial and lateral surfaces of the lateral plate defining a soft tissue attachment surface;

a projection extending from the medial surface and being configured to mate with a recess formed in the lateral side of the proximal femoral body implant;

an aperture formed in the lateral plate and extending through the projection such that the aperture is configured to be coaxially aligned with a lateral bore formed in the proximal femoral body implant; and

at least one threaded bore extending from one of the lateral surface or the medial surface, the threaded bore being configured to receive the plate fastener for securing soft tissue to the lateral plate; and

an implant fastener configured to be received through the aperture and configured to be threadably secured to the lateral bore of the proximal femoral body implant to couple the lateral plate to the proximal femoral body implant, the fastener having a length sufficient to also pass through a portion of the femur for securing the portion of the femur to the lateral plate and the proximal femoral body implant,

wherein the recess is coaxial with the lateral bore formed in the proximal femoral body implant,

wherein the projection includes a tapered cylindrical portion and the recess includes a complementary shaped tapered counterbore adapted to receive the tapered cylindrical portion in a press fit configuration, and

wherein the lateral plate further comprises a proximal end adapted to extend a distance beyond a proximal end of the proximal femoral body implant, the proximal end of the lateral plate including a sharp projection configured to attach the lateral plate to the soft tissue.

9. The implant of claim **8**, wherein the lateral plate includes a layer of porous metal to enhance biologic fixation.

10. The implant of claim **8**, further comprising a ligament washer including an aperture configured to receive the plate fastener.

11. The implant of claim **10**, wherein the ligament washer comprises a body portion including a fastener engaging side and a soft tissue facing side, the soft tissue facing side including a plurality of circumferentially spaced ligament engagement members.

12. The implant of claim **11**, wherein the ligament washer further comprises an insert configured to abut the body portion of the ligament washer.

13. The implant of claim **12**, wherein the insert is coated with a layer of porous material.

14. The implant of claim **12**, wherein the insert is formed entirely of porous metal.

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